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# A REVISED DIRECTIONS TEST

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The directions tests of Woodworth and Wells* have proved themselves so valuable and are being used so extensively by various psychologists that it is surprising that no norms have yet appeared. The writers offer the data they have collected up to the present time in the hope that they may prove serviceable to other workers.

The Easy Directions Test B and the Hard Directions Test have been used. These tests are reproduced in Figures 1 and 2 respectively. The numbering of the directions does not appear on the test sheets. We have inserted the numbers on the figures for purposes of reference. The Easy Directions Test was given to 429 children ranging in age from 6 to 16. The Hard Directions Test was given to 1327 children ranging in age from 7 to 17, and to a heterogenous group of adults.

The instructions in each case were very simple: "I want to see if you can fill these out according to directions. Do exactly what each line tells you to do. Try to fill them out correctly." No definite time limit was adhered to because we wished the children to try all the directions. As a matter of fact the majority of pupils finished in much less than ten minutes. The test was given as a class test.

A score of *one* was given for each direction correctly answered in the Easy Directions. The total possible score in this test is therefore 20. A direction had to be literally correct before a score was allowed. Direction 1 was given credit only when some sort of a mark crossed out the g and the g only. Direction 2 received credit only for the figure "2" placed between the two dots, the word "two" not receiving credit. Direction 3 received credit for the answer, "three," "3", or "III," "three feet," etc., or any answer conveying

*WOODWORTH, R. S. AND WELLS, F. L. *Association Tests*, Psychol. Monog., Vol. XII, No. 57, 1911.

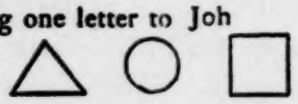
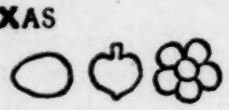
1. Cross out the *g* in *tiger*
2. Write 2 between the two dots: . . ——
3. How many feet make a yard?
4. Write + over the longest word. It rained yesterday.
5. Put a dot below this line: ————————
6. Write the sum of these numbers: $\frac{3}{4}$
7. Make a boy's name by adding one letter to Joh
8. Make a cross in the circle: 
9. What comes next after D in the alphabet?
10. Write 7 in the largest square:
11. Cross out the blackest letter in TEXAS
12. Write *g* on the egg-shaped figure: 
13. Make two dots between these lines:
14. Put the sign = where it belongs: 3 + 2 5.
15. Write here.....the middle letter of *get*.
16. Put a nose on this face:
17. Add a cross and make these rows equal: X X X / X X X X
18. Put a dot in the circle, below the center:
19. Draw a line around the three dots: . . . . . . .
20. Cross out the last word in this sentence.

Figure 1. Easy Directions. Test B.

1. With your pencil make a dot over any one of these letters F G H I J, and a comma after the longest of these three words: boy mother girl. 2. Then, if Christmas come, in March, make a cross right here.....but if not, pass along to the next puestion, and tell where the sun rises..... 3. If you believe that Edison qiscovered America, cross out what you just wrote, but if it was some one else, dut in a number to complete this sentence: "A horse has.....feet." 4. Write *yes*, no matter whether China is in Africa or not.....; and then give a wrong answer to this question: "How many days are there in the week?"..... 5. Write any letter except *g* just after this comma,.....and then write *no* if 2 times 5 are 10..... 6. Now, if Tuesday comes after Monday, make two crosses here....., but if not, make a circle here.....or else a square here..... 7. Be sure to make three crosses between these two names of boys: George.....Henry. 8. Notice these two numbers: 3, 5. If iron is heavier than water, write the larger number here....., but if iron is lighter write the smaller number here..... 9. Show by a cross when the nights are longer: in summer?.....in winter?..... 10. Give the correct answer to this question: "Does water run uphill?"..... and repeat your answer here..... 11. Do nothing here (5+7=.....), unless your skipped the preceding question; but write the first letter of your first name and the last letter of your last name at the ends of this line:

FIGURE 2

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the idea, three. No. 4 received credit only for the sign + written *above* "yesterday," no credit for "X" or for any other sign or in any other position than *above* "yesterday." No. 5 had to have the dot fairly below the black line. Credited responses to directions 6 are "7" or "seven" *with* or *without* drawing the addition bar, and the answer placed in any position with respect to the two figures to be added. In direction 7, credit was given when "n" or "N" was added to the end of "Joh," but no credit was given for writing out the word "John" and neglecting to complete the partial "Joh." No. 8, credit for either "X" or "+" in the circle. No. 9, credit for "e" or "E". No. 10, credit only for the figure, "7," not for the word, "seven," in the largest square. No. 11, credit for any mark through "X" only. No. 12, credit for "G" or "g" (perhaps a slight deviation from our principle of literal exactness). No. 13, credit for two dots placed anywhere between the two lines. No. 14, credit only for "–" placed in the proper place, no credit for "–" or "+," etc. No. 15, credit for "e" or "E." No. 16, credit for any mark filling up

the greater portion of the blank left in the outline. No. 17, credit for "X" in the proper place. No. 18, credit for a dot anywhere in the lower one-third area of the circle below the dot in the centre. No. 19, credit for any shaped line enclosing the three dots only. No. 20, credit for a horizontal line through "sentence" or for any mark crossing out *at least two* of the letters, no credit for any line crossing out only one letter, as in "sentence," because this is a response to a misinterpretation of the direction whereby "letter" is understood instead of "word."

The Hard Directions Test was scored in the manner suggested by Woolley.* A credit of one point was given to each simple direction and a credit of two points for each compound or conditional direction answered correctly. If the conditional direction was only partially correct then a credit of one point was allowed. The conditional directions are numbers 2, 3, 6, 8, and 11. *No credit was given either part of the condition unless one or the other of the parts was attempted as shown by some mark or other on the paper.* This procedure was necessary because credit is sometimes given for doing nothing in one part of the condition. First direction, one credit for a dot *above* any *one* of the five letters and one credit for a comma after "mother," thus making two credits if both are correctly done. Second, one credit for *not* making a cross, and one for "east," no credit for "west," etc.; if a cross is made in the first part of the direction and nothing done to the second part, then one credit was given (an intelligent response based on wrong information); if both parts are answered, one credit was given for answer to the second half. Third, credit for *not* crossing out anything in the *preceding* sentence and then if nothing is crossed out an additional credit for "four" or "4" placed in proper space; one credit is given if the second half is answered correctly and the first part incorrectly. This direction is unsatisfactory, since the subject may have already crossed out the word written in the preceding sentence before coming to this direction because the word was wrong. Fourth, one credit for "yes" and one credit for *any* number or figure other than "7" or "seven." Fifth, one credit for *any* letter other than "g," and one credit for "no." Sixth, credit for "XX" or "++" and an additional one for *not* doing anything in the other two spaces; a single credit of one is given for filling in the second part of this direction

*The writers wish to thank Mrs. H. T. Woolley for sending them detailed directions as to her method of scoring.

without filling in the first (an intelligent response based on wrong information). Seventh, one credit for "XXX" or "+++" or "***." Eighth, credit of one for "5" in first blank and an additional credit if nothing is done in the second, one credit if the second part *alone* is filled with "3;" a credit of one if "5" is placed in the first blank and "3" also in the second. Ninth, one credit for "+" or "X" after "winter," no credit for a mark after "summer" or for a mark after both "summer" and "winter." Tenth, one credit for "no" or "it does not," etc., and one additional credit for repeating *exactly* the first answer; in case the first answer were "yes" or anything else, and this is correctly repeated, one credit is given for the correct repetition. Eleventh, one credit for doing nothing to the first part *if* the preceding direction was attempted (one credit for "12," if the preceding direction was not attempted) and one credit for "J. e." or "J. E.," if the subject's name is John Doe, placed after the word, "line." In accordance with the principle first laid down, no credit at all is given for this direction (if the preceding direction was attempted) unless the second part of the direction is attempted.

The results for the individuals tested grouped according to age are given in Tables I and II. Table I shows the percentiles at each age for the Easy Directions Test. The table is to be read as follows:

TABLE I

*Easy Directions Test. Percentiles*

| Age | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Percentiles | | | | | | | | | | | |
| 100 | 8 | 16 | 16 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| 90 | 8 | 13 | 12 | 19 | 20 | 19 | 20 | 20 | 20 | .. | .. |
| 80 | 6 | 10 | 12 | 19 | 20 | 19 | 20 | 19 | 20 | .. | .. |
| 70 | 2 | 8 | 10 | 19 | 19 | 19 | 19 | 19 | 20 | .. | .. |
| 60 | 2 | 6 | 9 | 18 | 19 | 19 | 19 | 19 | 19 | .. | .. |
| 50 | 2 | 4 | 7 | 18 | 18 | 18 | 18 | 19 | 19 | 19 | 20 |
| 40 | 1 | 3 | 7 | 18 | 18 | 18 | 18 | 18 | 18 | .. | .. |
| 30 | 0 | 2 | 5 | 17 | 18 | 17 | 17 | 18 | 18 | .. | .. |
| 20 | 0 | 1 | 3 | 17 | 17 | 17 | 17 | 17 | 18 | .. | .. |
| 10 | 0 | 0 | 1 | 14 | 17 | 15 | 16 | 17 | 17 | .. | .. |
| 0 | 0 | 0 | 0 | 14 | 15 | 5 | 12 | 15 | 14 | 9 | 13 |
| No. of Cases | 11 | 81 | 32 | 10 | 38 | 60 | 69 | 58 | 38 | 24 | 8 |

the highest or 100 percentile score made by six-year-old children is 8; ten per cent. of the children below the highest scored 8 also, and so on down the column. The other columns are to be interpreted in the same way.

Table II shows the percentiles at each age for the Hard Directions Test. The table is to be interpreted in the same manner as Table I.

TABLE II

*Hard Directions Test. Percentiles*

| Age | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | Ad. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Percentile | | | | | | | | | | | | |
| 100 | 18 | 19 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| 90 | 14 | 16 | 18 | 18 | 18 | 19 | 19 | 20 | 20 | 19 | 19 | 20 |
| 80 | 13 | 13 | 17 | 17 | 17 | 18 | 19 | 19 | 19 | 19 | 19 | 20 |
| 70 | 11 | 12 | 16 | 16 | 16 | 17 | 18 | 18 | 18 | 18 | 16 | 20 |
| 60 | 8 | 10 | 13 | 13 | 15 | 16 | 18 | 18 | 18 | 17 | 16 | 20 |
| 50 | 8 | 9 | 12 | 12 | 14 | 14 | 17 | 17 | 16 | 16 | 16 | 19 |
| 40 | 6 | 8 | 11 | 11 | 13 | 13 | 16 | 16 | 15 | 16 | 15 | 19 |
| 30 | 5 | 7 | 9 | 8 | 10 | 11 | 15 | 15 | 14 | 15 | 13 | 18 |
| 20 | 3 | 6 | 8 | 7 | 9 | 10 | 13 | 14 | 12 | 13 | 10 | 17 |
| 10 | 1 | 3 | 6 | 6 | 3 | 6 | 9 | 11 | 9 | 9 | 8 | 15 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 11 |
| No. of Cases | 22 | 79 | 115 | 124 | 124 | 154 | 213 | 253 | 144 | 45 | 10 | 44 |

The table for the Easy Directions Test shows that the test discriminates fairly well between the varying abilities of six, seven and eight-year-olds, in-as-much as all these ages show a gradual increase in the scores from the 0 to the 100 percentile at each age, and, furthermore, each age shows an increase over the preceding age. The number of cases tested at age nine is not sufficient, but from that age on we note very little difference in the percentile scores for each age and scarcely any increase from age to age. The Hard Directions Test shows discriminative capacity from age seven up to age thirteen, or fourteen, in-as-much as the percentile scores show a gradual increase for each age and also from one age to the other.

The fifty percentile at each age gives the median or norm for each age. Figure 3 shows the median scores for both the Easy and the Hard Directions Tests. We note that on Test B the scores increase gradually from age six to age eight, and that at age nine there is a sudden increase in score with but little increase thereafter. This would seem to indicate that the directions are entirely too easy for all ages after age nine. The Hard Directions increase gradually from age seven to thirteen with no increase thereafter except for the adults. This would seem to indicate that this test is too easy after age thirteen. The peculiar overlapping of the curves at ages seven

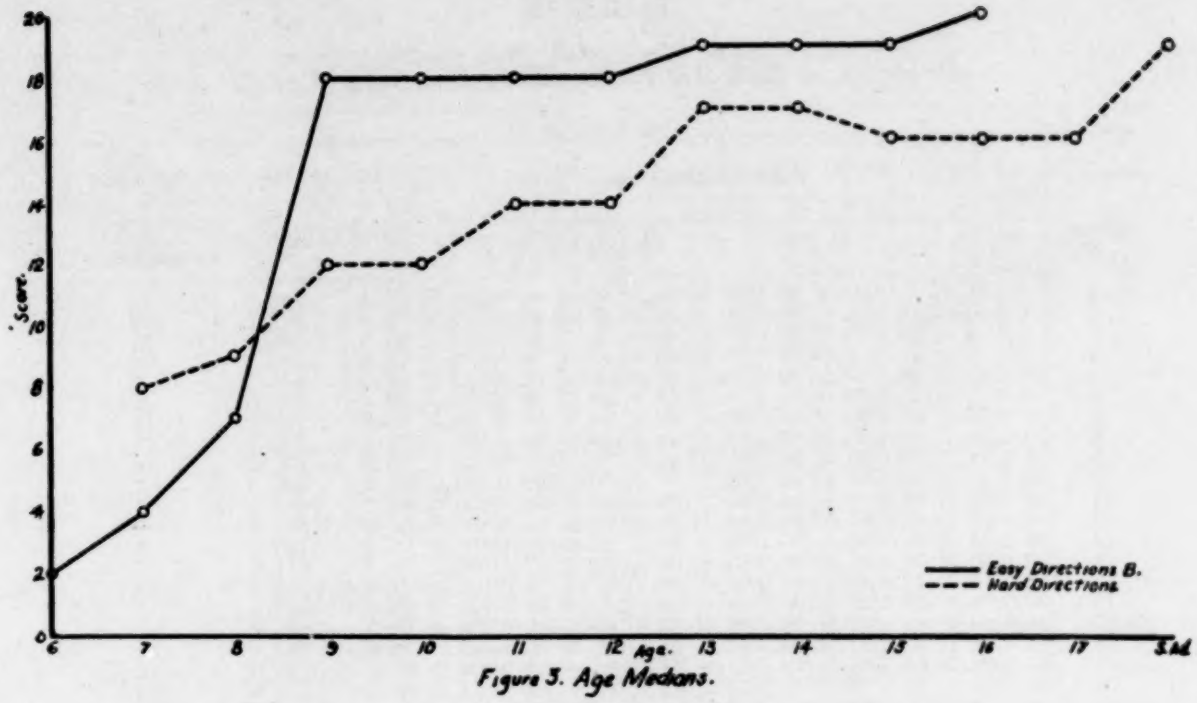



*Figure 3. Age Medians.*

and eight is due to the fact that the seven and eight-year-olds tested on the Hard Directions Test are mainly the brighter accelerated pupils found in the higher grades. These norms are obviously too high for seven and eight-year-olds in general.

If these tests are to be used, then, they can only be used within the limits already mentioned, Test B from age six to age nine inclusive and the Hard Directions from age seven or eight to age thirteen inclusive. It would be much more desirable to have one test covering all ages from age six to age thirteen, or even better, to adult. The two tests might simply be massed together as one test giving us a test covering ages six to thirteen. This procedure would, however, give us too cumbersome a test because much useless material, due to relative equality of many of the directions, would evidently be included. It, therefore, would seem to be a better procedure to determine the relative difficulty of the different directions and eliminate those found inadequate.

## Relative Difficulty of the Directions

*Easy Directions Test.* From a mere inspection of the directions in either test, it is obvious that they differ greatly among themselves in difficulty. From the data gathered we are able to estimate the relative difficulty of each direction.

## TABLE III

*Percentage of Each Age Passing Each Direction. Test B.*

| Direc. No. | Chronological Age | | | | | | | | | | (a) Total | (b) Aggregate % | (c) Aggregate % ranking in order of difficulty |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | | | |
| 1 | 22.1 | 21.9 | 70.6 | 92.5 | 90.0 | 88.5 | 93.0 | 92.0 | 95.8 | 100.0 | 72.2 | 766 4 | 13 |
| 2 | 34.6 | 40.6 | 76.5 | 85.0 | 93.3 | 90.0 | 88.0 | 92.0 | 87.5 | 100.0 | 75.1 | 787.5 | 9 |
| 3 | 6.2 | 9.4 | 58.8 | 75.0 | 80.0 | 87.0 | 88.0 | 94.7 | 87.5 | 100.0 | 63.5 | 686.6 | 17 |
| 4 | 3.7 | 0.0 | 41.2 | 65.0 | 66.7 | 75.5 | 63.8 | 65.0 | 70.9 | 71.4 | 49.6 | 523.2 | 20 |
| 5 | 50.5 | 62.5 | 88.5 | 97.5 | 93.3 | 94.3 | 93.0 | 100.0 | 95.8 | 100.0 | 84.0 | 875.4 | 3 |
| 6 | 3.7 | 3.1 | 41.2 | 80.0 | 85.0 | 78.3 | 91.4 | 86.7 | 54.2 | 71.4 | 59.1 | 595.0 | 19 |
| 7 | 16.0 | 25.0 | 58.8 | 92.5 | 96.7 | 91.4 | 82.7 | 94.7 | 95.8 | 85.7 | 70 8 | 739.3 | 15 |
| 8 | 11.1 | 18.7 | 88.5 | 95.0 | 86.7 | 91.4 | 94.9 | 100.0 | 95.8 | 100.0 | 71 8 | 782.1 | 12 |
| 9 | 22.2 | 31.2 | 70.6 | 92.5 | 96.7 | 97.1 | 96.5 | 94.7 | 100.0 | 85.7 | 76.0 | 787.2 | 10 |
| 10 | 60.5 | 78.3 | 94.5 | 97.5 | 96.7 | 97.1 | 98.3 | 100.0 | 100.0 | 100.0 | 89.2 | 922.9 | 2 |
| 11 | 42.0 | 62.6 | 82.6 | 97.5 | 91.7 | 97.1 | 100.0 | 100.0 | 100.0 | 100.0 | 83.3 | 873.5 | 4 |
| 12 | 83.4 | 53.1 | 82.6 | 97.5 | 93.3 | 97.1 | 94.9 | 97.5 | 91.6 | 100.0 | 80.0 | 841.0 | 6 |
| 13 | 29.6 | 34.4 | 70.6 | 90.0 | 90.0 | 94.3 | 89 6 | 92.0 | 100.0 | 100.0 | 75.1 | 790.5 | 8 |
| 14 | 39.6 | 50.0 | 70.6 | 87.5 | 90.0 | 92.8 | 98.3 | 94.7 | 87.5 | 100.0 | 78.4 | 811.0 | 7 |
| 15 | 12.7 | 18.7 | 70.6 | 82.5 | 95.0 | 92.8 | 94 9 | 97.5 | 91.6 | 100.0 | 71.1 | 756.3 | 14 |
| 16 | 64.3 | 78.3 | 100.0 | 97.5 | 100.0 | 98.6 | 100.0 | 100.0 | 95.8 | 100.0 | 90.8 | 934.5 | 1 |
| 17 | 34.6 | 40.6 | 82.6 | 97.5 | 98.3 | 98.6 | 96.5 | 97.5 | 100.0 | 100.0 | 80.9 | 846.2 | 5 |
| 18 | 17.3 | 28.1 | 70.6 | 97.5 | 96.7 | 97.1 | 98.3 | 100.0 | 95.8 | 85.7 | 75.8 | 787.1 | 11 |
| 19 | 27.1 | 50.0 | 64.9 | 85.0 | 76.7 | 74.0 | 82.7 | 84.0 | 70.9 | 100.0 | 66.6 | 715.3 | 16 |
| 20 | 29.7 | 34.4 | 47.1 | 72.5 | 70.0 | 72.5 | 84.5 | 89.4 | 83.3 | 71.4 | 63.8 | 654.8 | 18 |
| No. Cases | 81 | 32 | 17 | 40 | 60 | 69 | 58 | 37 | 24 | 7 | Total Cases 425 | | |

Table III shows the percentage of cases at each age able to respond correctly. The numbers in this and the following tables do not correspond exactly to those given in Tables I and II on account of exclusion of a few cases that could not be classified and to inclusion of extra cases where these had been obtained at the time of making up the different tables. The table is to be read as follows: Of the 81 seven-year-olds tested 22.1 per cent. were able to pass the first direction; 34.6 per cent. the second direction, and so on for each of the other directions and for the other ages. The next to the last vertical column, (b), shows the aggregate percentage passing each of the directions, found by adding the percentages at each age for the direction considered, and from this is derived the last vertical column, (c), which shows the ranking in order of difficulty of the twenty directions. Direction 16 has an aggregate percentage of 934.5, which is the largest value, and therefore this direction is given a rank of 1 because it is the easiest direction as determined by this method of estimating difficulty.

Table IV shows the score made on each direction at each age. The table is to be read as follows: All the seven-year-olds together

TABLE IV

*Scores Made on Each Direction by Ages. Test B.*

| Age | Direction Number— | | | | | | | | | | | | | | | | | | | | No. of Cases |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | |
| 7 | 18 | 28 | 5 | 3 | 41 | 3 | 13 | 9 | 18 | 49 | 33 | 27 | 24 | 32 | 10 | 52 | 28 | 14 | 22 | 24 | 81 |
| 8 | 7 | 13 | 3 | 0 | 20 | 1 | 8 | 6 | 10 | 25 | 20 | 17 | 11 | 16 | 6 | 25 | 13 | 9 | 16 | 11 | 32 |
| 9 | 12 | 13 | 10 | 7 | 15 | 7 | 10 | 15 | 12 | 16 | 14 | 14 | 12 | 12 | 12 | 17 | 14 | 12 | 11 | 8 | 17 |
| 10 | 37 | 34 | 30 | 26 | 39 | 32 | 37 | 38 | 37 | 39 | 39 | 39 | 36 | 35 | 33 | 39 | 39 | 39 | 34 | 29 | 40 |
| 11 | 54 | 56 | 48 | 40 | 56 | 51 | 58 | 52 | 58 | 58 | 55 | 56 | 54 | 54 | 57 | 60 | 59 | 58 | 46 | 42 | 60 |
| 12 | 61 | 62 | 60 | 52 | 65 | 54 | 63 | 63 | 67 | 67 | 67 | 67 | 65 | 64 | 64 | 68 | 68 | 67 | 51 | 50 | 69 |
| 13 | 54 | 51 | 51 | 37 | 54 | 53 | 48 | 55 | 56 | 57 | 58 | 55 | 52 | 57 | 55 | 58 | 56 | 57 | 48 | 49 | 58 |
| 14 | 34 | 34 | 35 | 24 | 37 | 32 | 35 | 37 | 35 | 37 | 37 | 36 | 34 | 35 | 36 | 37 | 36 | 37 | 31 | 33 | 37 |
| 15 | 23 | 21 | 21 | 17 | 23 | 13 | 23 | 23 | 24 | 24 | 24 | 22 | 24 | 21 | 22 | 23 | 24 | 23 | 17 | 20 | 24 |
| 16 | 7 | 7 | 7 | 5 | 7 | 5 | 6 | 7 | 6 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 6 | 7 | 5 | 7 |
| Total | 307 | 319 | 270 | 211 | 357 | 251 | 301 | 305 | 323 | 379 | 354 | 340 | 319 | 333 | 302 | 386 | 344 | 322 | 283 | 271 | 425 |
| Ranking | 12 | 10.5 | 18 | 20 | 3 | 19 | 15 | 13 | 8 | 2 | 4 | 6 | 10.5 | 7 | 14 | 1 | 5 | 9 | 16 | 17 | |

scored 18 on direction 1, 28 on direction 2 and so on. This table may also be regarded as showing the total number passing each direction at each age because a score of one is allowed for each direction. The next to the last horizontal line shows the total score for each direction and from this total score is derived the last line which shows the ranking of the 20 directions in order of difficulty. Column (a), of Table III shows the percentage of the total children passing each direction as calculated from the total number passing each direction in Table IV.

Table V shows the ranking of the 20 directions in order of difficulty for each age. This table is derived from Table III, which showed the percentage passing each direction at each age. Table V is to be read as follows: For the seven-year-olds direction 1 was the thirteenth in order of difficulty, direction 2 the sixth in order of difficulty and so on. The next to the last horizontal row gives the total rank for each direction and from this row is derived the amalgamated ranking in the last row of the table. Table VI shows the ranking of the directions by the three methods.

*Correlation of the Three Different Methods of Ranking.* The correlations of these three methods are as follows (Spearman's Foot Rule Method):

A with B, r = .97
A with C, r = .98
B with C, r = .99

A. Amalgamated Rank
B. Aggregate Per Cent.
C. Total Score.

TABLE V.

*Ranking of Directions in Order of Difficulty, by ages. Test B.*
*(Based on the percent scoring on each direction.)*

| Age | Direction Number— | | | | | | | | | | | | | | | | | | | | Number of Cases |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | |
| 7 | 13 | 6.5 | 18 | 19.5 | 3 | 19.5 | 15 | 17 | 12 | 2 | 4 | 8 | 10 | 5 | 16 | 1 | 6.5 | 14 | 11 | 9 | 81 |
| 8 | 15 | 8.5 | 18 | 20 | 5 | 19 | 14 | 16.5 | 12 | 1.5 | 5 | 5 | 10.5 | 5 | 16.5 | 1.5 | 8.5 | 13 | 5 | 10.5 | 32 |
| 9 | 11.5 | 8 | 16.5 | 19.5 | 3.5 | 19.5 | 16.5 | 3.5 | 11.5 | 2 | 6 | 6 | 11.5 | 11.5 | 11.5 | 1 | 6 | 11.5 | 15 | 18 | 17 |
| 10 | 10 | 14.5 | 18 | 20 | 4 | 17 | 10 | 8 | 10 | 4 | 4 | 4 | 12 | 13 | 16 | 4 | 4 | 4 | 14.5 | 19 | 40 |
| 11 | 13 | 9 | 17 | 20 | 9 | 16 | 4.5 | 15 | 4.5 | 4.5 | 11 | 9 | 13 | 13 | 7 | 1 | 2 | 4.5 | 18 | 19 | 60 |
| 12 | 15 | 14 | 16 | 18 | 8.5 | 17 | 12.5 | 12.5 | 5 | 5 | 5 | 5 | 8.5 | 10.5 | 10.5 | 1.5 | 1.5 | 5 | 19 | 20 | 69 |
| 13 | 11.5 | 15.5 | 15.5 | 20 | 11.5 | 13 | 18.5 | 9 | 6.5 | 4 | 1.5 | 9 | 14 | 4 | 9 | 1.5 | 6.5 | 4 | 18.5 | 17 | 58 |
| 14 | 15 | 15 | 11.5 | 20 | 3.5 | 18 | 11.5 | 3.5 | 11.5 | 3.5 | 3.5 | 8. | 15 | 11.5 | 8 | 3.5 | 8 | 3.5 | 19 | 17 | 37 |
| 15 | 8.5 | 15 | 15 | 18.5 | 3.5 | 20 | 8.5 | 8.5 | 3 | 3 | 3 | 12.5 | 3 | 15 | 12.5 | 8.5 | 3 | 8.5 | 18.5 | 17 | 24 |
| 16 | 7.5 | 7.5 | 7.5 | 19 | 7.5 | 19 | 16 | 7.5 | 16 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 | 5.7 | 7.5 | 17 | 7.5 | 19 | 7 |
| Total | 120.0 | 113.5 | 153.0 | 194.5 | 64.0 | 178.0 | 127.0 | 101.0 | 92.0 | 37.0 | 50.5 | 74.0 | 105.0 | 96.0 | 114.5 | 31.0 | 53.5 | 85.0 | 146.0 | 165.5 | 425 |
| Ranking | 14 | 12 | 17 | 20 | 5 | 19 | 15 | 10 | 8 | 2 | 3 | 6 | 11 | 9 | 13 | 1 | 4 | 7 | 16 | 18 | |

TABLE VI.

*Ranking of Directions in Order of Difficully by Three Methods. Easy Directions*

| Method | Ranking of Sentence Number | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| A. Amal. Ranking | 14 | 12 | 17 | 20 | 5 | 19 | 15 | 10 | 8 | 2 | 3 | 6 | 11 | 9 | 13 | 1 | 4 | 7 | 16 | 18 |
| B. Aggr. Per Cent. | 13 | 9 | 17 | 20 | 3 | 19 | 15 | 12 | 10 | 2 | 4 | 6 | 8 | 7 | 14 | 1 | 5 | 11 | 16 | 18 |
| C. Total Score | 12 | 10.5 | 18 | 20 | 3 | 19 | 15 | 13 | 8 | 2 | 4 | 6 | 10.5 | 7 | 14 | 1 | 5 | 9 | 16 | 17 |

Since C gives a higher average correlation with the two other methods than either of the other two methods, A and B, with the two remaining methods in each case, therefore C was taken as most probably representing the true order of difficulty of the directions. Correlating the ranking of each separate age, Table V, with the total ranking of method C, we obtain the results shown in Table VII.

TABLE VII

*Correlation of Each Age with Method C. Easy Directions*

| | Age | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | Av'g. |
| Correlation r..... | .89 | .84 | .91 | .85 | .70 | .82 | .76 | .72 | .69 | .51 | .769 |

The high correlations for the lower ages and the gradual tendency of the correlations to decrease with increase of age is just what we should expect from a test difficult enough for only the lower ages. Pupils of higher ages may be expected to show their ability to better advantage on directions suited to their ability rather than upon directions much too easy for their age. An examination of Table III shows that the test is entirely too easy for all ages above age 9; the hardest direction for the ten-year-olds is passed by 65 per cent. of the group.

*Hard Directions.* The Hard Directions were subjected to the same kind of analysis as the Easy Directions. It was found that only a very small percentage of those tested made partial scores on any of the directions; and since the inclusion of these partial scores in the determination of the difficulty of these directions complicates the statistical work with little or no advantage, the scores of a perfect performance of both parts of the direction, where such occur, are the only ones included in the tables presented.

Table VIII shows the percent. passing each direction at each age, the total percentages passing each direction and the aggregate per cent. (sum of the per cents. at each age) with the aggregate ranking derived therefrom.

Table IX shows the number of persons passing both parts of each direction. The scores would, of course, be quite different, two credits in the original scoring having been given for directions 1, 2, 3, 4, 5, 6, 8, 10, 11, and one credit each for directions 7 and 9. It is obvious that the difficulty of each direction should be computed upon the number passing each direction, not the scores on each unless weighted properly, when the scores are not the same on every direction.

TABLE VIII

*Per Cent Passing Each Direction by Ages. Hard Directions.*

| Direction | Per Cent Passing at the Age— | | | | | | | | | Total | Aggregate per cent | Aggregate ranking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | | | |
| 1 | 6.9 | 31.1 | 31.1 | 39.6 | 53.8 | 66.0 | 65.0 | 69.4 | 62.0 | 57.3 | 424.9 | 9 |
| 2 | 34.5 | 55.5 | 55.5 | 58.4 | 59.0 | 70.5 | 74.5 | 77.8 | 76.3 | 68.1 | 562.0 | 4 |
| 3 | 58.6 | 80.0 | 71.1 | 62.5 | 61.1 | 78.5 | 74.8 | 70.8 | 76.3 | 72.3 | 633.7 | 3 |
| 4 | 17.3 | 51.1 | 33.4 | 66.6 | 62.3 | 75.0 | 73.1 | 67.8 | 71.5 | 65.8 | 518.1 | 6 |
| 5 | 13.8 | 40.0 | 42.2 | 41.6 | 66.5 | 76.3 | 84.2 | 71.6 | 76.3 | 68.7 | 512.5 | 7 |
| 6 | 27.7 | 51.1 | 53.4 | 60.5 | 69.5 | 83.5 | 74.8 | 70.1 | 69.1 | 70.1 | 559.7 | 5 |
| 7 | 34.5 | 60.0 | 62.2 | 66.6 | 80.1 | 83.0 | 90.3 | 88.5 | 90.5 | 80.9 | 655.7 | 1 |
| 8 | 6.9 | 26.6 | 33.4 | 41.6 | 50.6 | 59.2 | 62.0 | 60.8 | 38.1 | 50.2 | 379.2 | 10 |
| 9 | 10.4 | 37.8 | 28.8 | 56.3 | 51.7 | 61.5 | 69.2 | 57.7 | 64.3 | 57.0 | 437.7 | 8 |
| 10 | 34.5 | 64.3 | 73.4 | 70.9 | 74.8 | 86.5 | 89.3 | 78.5 | 81.0 | 79.9 | 653.2 | 2 |
| 11 | 3.5 | 15.5 | 13.4 | 29.2 | 47.5 | 56.8 | 60.3 | 55.5 | 42.8 | 47.9 | 324.5 | 11 |
| No. of Cases | 29 | 45 | 45 | 48 | 95 | 176 | 234 | 130 | 42 | 844 | | |

TABLE IX

*Number Passing Each Direction by Ages. Hard Directions*

| Age | Number Passing Direction— | | | | | | | | | | | Number of Cases |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | |
| 8 | 2 | 10 | 17 | 5 | 4 | 8 | 10 | 2 | 3 | 10 | 1 | 29 |
| 9 | 14 | 25 | 36 | 23 | 18 | 23 | 27 | 12 | 17 | 29 | 7 | 45 |
| 10 | 14 | 25 | 32 | 15 | 19 | 24 | 28 | 15 | 13 | 33 | 6 | 45 |
| 11 | 19 | 28 | 30 | 32 | 20 | 29 | 32 | 20 | 27 | 34 | 14 | 48 |
| 12 | 51 | 56 | 58 | 59 | 63 | 66 | 76 | 48 | 49 | 71 | 45 | 95 |
| 13 | 116 | 124 | 138 | 132 | 134 | 147 | 146 | 104 | 108 | 152 | 100 | 176 |
| 14 | 152 | 174 | 175 | 171 | 197 | 175 | 211 | 145 | 162 | 209 | 141 | 234 |
| 15 | 90 | 101 | 92 | 88 | 93 | 91 | 115 | 79 | 75 | 102 | 72 | 130 |
| 16 | 26 | 32 | 32 | 30 | 32 | 29 | 38 | 16 | 27 | 34 | 18 | 42 |
| Total | 484 | 575 | 610 | 555 | 580 | 592 | 683 | 441 | 481 | 674 | 404 | 844 |
| Ranking | 8 | 6 | 3 | 7 | 5 | 4 | 1 | 10 | 9 | 2 | 11 | |

Table X gives the ranking in order of difficulty of all directions by ages, as calculated from the percentage passing each direction at each age.

Table XI shows the ranking of the directons in order of difficulty for all ages by the three methods; A, amalgamated rank, B, aggregate per cent, C, total score.

TABLE X

*Ranking of Directions in Order of Difficulty by Ages. Hard Directions*

| Age | Ranking of Direction Number | | | | | | | | | | | Number of Cases |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | |
| 8 | 9.5 | 3 | 1 | 6 | 7 | 5 | 3 | 9.5 | 8 | 3 | 11 | 29 |
| 9 | 9 | 4 | 1 | 5.5 | 7 | 5.5 | 3 | 10 | 8 | 2 | 11 | 45 |
| 10 | 9 | 4 | 2 | 7.5 | 6 | 5 | 3 | 7.5 | 10 | 1 | 11 | 45 |
| 11 | 10 | 6 | 4 | 2.5 | 8.5 | 5 | 2.5 | 8.5 | 7 | 1 | 11 | 48 |
| 12 | 8 | 7 | 6 | 5 | 4 | 3 | 1 | 10 | 9 | 2 | 11 | 95 |
| 13 | 8 | 7 | 4 | 6 | 5 | 2 | 3 | 10 | 9 | 1 | 11 | 176 |
| 14 | 9 | 6 | 4.5 | 7 | 3 | 4.5 | 1 | 10 | 8 | 2 | 11 | 234 |
| 15 | 7 | 3 | 5 | 8 | 4 | 6 | 1 | 9 | 10 | 2 | 11 | 130 |
| 16 | 9 | 4 | 4 | 6 | 4 | 7 | 1 | 11 | 8 | 2 | 10 | 42 |
| Total | 78.5 | 44 | 31.5 | 53.5 | 48.5 | 43 | 18.5 | 85.5 | 77 | 16 | 98 | 844 |
| Ranking | 9 | 5 | 3 | 7 | 6 | 4 | 2 | 10 | 8 | 1 | 11 | |

TABLE XI

*Ranking of Each Direction by the Three Methods. Hard Directions*

| Method | Ranking of Direction Number | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| A. Amal. Rank | 9 | 5 | 3 | 7 | 6 | 4 | 2 | 10 | 8 | 1 | 11 |
| B. Aggr. % | 9 | 4 | 3 | 6 | 7 | 5 | 1 | 10 | 8 | 2 | 11 |
| C. Total Score | 8 | 6 | 3 | 7 | 5 | 4 | 1 | 10 | 9 | 2 | 11 |

Correlating the three methods we find (Spearman's Foot Rule Method):

A with B, r = .97
A with C, r = .97
B with C, r = .95

On the basis of the reasoning in the case of the Easy Directions, since A gives a higher average correlation with B and C than does B or C with the remaining two, A should be the more reliable measure. The high average correlation of C, however, shows that C is a very reliable measure and we shall use this method throughout. It is obvious that any of the rankings would be reliable enough for our purpose. In this connection it is interesting to note that the inclusion of a group of 166 heterogenous adults, 11 backward pupils in the public schools, 17 professional people, 44 college students, 94 men seeking employment at a free public employment office, changed the total order of difficulty only in that, where before direction 5 preceded direction 2 in difficulty, after the inclusion of this group direction 5 followed direction 2 in difficulty.

Table XII gives the correlations of the ranking for each age (Table X) correlated with the total ranking in difficulty, method C.

TABLE XII

*Correlations of Ranking at Each Age with Method C.*

| Age..... | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | Av. |
|---|---|---|---|---|---|---|---|---|---|---|
| Correlation..... | .84 | .88 | .88 | .76 | .95 | .95 | .97 | .89 | .89 | .89 |

*Harder Directions.* Now since the two tests separately or in combination test only up to and including the thirteenth year, it seemed desirable to secure some harder directions to be included as a test for fourteen-year-olds and beyond Accordingly eight directions were secured, five of which were discarded as unsuitable. Of the three retained, numbers 5 and 8 were adaptations from Kelley's Reading Tests.*

The procedure was again the same as in the case of the last two tests. It is not necessary here to go into the details of the several operations as the norms secured from the test as a whole were inadequate, lacking differentiation; all but four of the tests were found too easy for the ages above 13; three of these four are incorporated in the final series and the fourth was excluded because of lack of differentiation from age to age and also because of equal median difficulty with one of the three chosen. The three ultimate-

*KELLEY, F. J., *The Kansas Silent Reading Tests*, Jour. of Educ. Psych. Vol. VII, 2, Feb. 1916., Pp. 3–80.

ly chosen are shown in Figure 4 as incorporated in our New Directions Test. (Their original numbers in the harder Directions Test were 8, 5, and 6, respectively).

The percentages passing each of the three chosen directions at each age are shown under "Harder Directions" in Table XIII. Direction 6, which becomes the last of our new series, *i. e.*, No. 15, proved too difficult for all but college students. Hence it was included as a test for "superior adults."

## A Suggested New Directions Test

By simply combining Test B and the Hard Directions on one sheet and securing norms for the combined sheet we might thereby get a test for ages 6 to 13 inclusive; similarly, by combining this new test with the Harder Directions Test we might get a test, more or less adequate, for all ages, 6 to "superior adult" inclusive. Such a test would, however, be cumbersome, due to the inclusion of too many directions of relatively equal difficulty. We propose therefore to eliminate the useless and inadequate directions and combine those remaining into one test which shall not be cumbersome and shall differentiate between all ages from 6 to "superior adults."

The directions selected should vary in difficulty from the easiest to the hardest. The directions should so vary in difficulty that each age will show an increase in score above the preceding age. The directions selected should show increasing percentages passing each direction with increasing age. To this end they should not involve more than the simplest kind of knowledge for their carrying out. Each age should be represented in the test with one or more directions passed by the median child, or by a safe margin of that age above 50 per cent., and which is not passed by the median child of the age below, by a safe margin below that age.

With all these points in mind we have chosen 15 directions from the three tests as best fulfilling these conditions. Table XIII gives the selected directions with the percentages passing at each age as taken from Tables III and VIII and the results from the Harder Directions Test. The percentages on the directions from the several tests are based necessarily on different numbers depending on which test they originally came from. The directions for the ages, 6, 7, 8, 9, are based on 425 persons tested by test B; the directions for ages 10, 11, 12, 13, are based on 844 persons tested by the Hard Directions Test; and the directions for ages 14, 15, and Adult are based on 698 persons tested on the Harder Directions Test.

## TABLE XIII

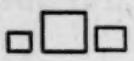
*Percentage Passing the Selected Sentences at Each Age*

| Test and Direct'n Number | Revised Test Numb'r | Direction | Per cent passing at age— 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | Sup Ad. | Total | Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Easy Direcs. | | | | | | | | (Based on 425 tested) | | | | | | | | | |
| 16 E | 1 | Put a nose on this face. | 36.2 | 64.3 | 78.3 | 100.0 | | | | | | | | | | 90.8 | 1 |
| 10 E | 2 | Write 7 in the largest square. | 45.4 | 60.5 | 78.3 | 94.5 | | | | | | | | | | 89.2 | 1 |
| 5 E | 3 | Put a dot below this line. | | 50.5 | 62.5 | 88.5 | 97.5 | | | | | | | | | 84.0 | 1 |
| 11 E | 4 | Cross out the blackest letter in Texas. | | 42.0 | 62.6 | 82.6 | 97.5 | | | | | | | | | 83.3 | 1 |
| 12 E | 5 | Write g on the egg-shaped figure. | | 33.4 | 53.1 | 82.6 | 97.5 | 93.3 | | | | | | | | 80.0 | 1 |
| 14 E | 6 | Put the sign = where it belongs. | | 39.6 | 50.0 | 70.6 | 87.5 | 90.0 | | | | | | | | 78.4 | 1 |
| 7 E | 7 | Make a boy's name by adding one letter to Joh | | | 25.0 | 58.8 | 92.5 | 96.7 | | | | | | | | 70.8 | 1 |
| 19 E | 8 | Draw a line around the three dots. | | | 50.0 | 64.9 | 85.0 | 76.7 | | | | | | | | 66.6 | 1 |
| Hard Direcs. | | | | | | | | (Based on 844 tested) | | | | | | | | | |
| 6 H | 9 | Now, if Tuesday comes after Monday,...here. | | | 27.7 | 51.1 | 53.4 | 60.5 | 69.5 | 83.5 | | | | | | 70.1 | 2 |
| 9 H | 10 | Show by a cross when the nights are longer... | | | | 37.8 | 28.8 | 56.3 | 51.7 | 61.5 | 69.2 | | | | | 57.0 | 2 |
| 8 H | 11 | Notice these two numbers 3 5. If iron...here. | | | | | 33.4 | 41.6 | 50.6 | 59.2 | 62.0 | | | | | 50.2 | 2 |
| 11 H | 12 | Do nothing here (5+7=...), unless....line. | | | | | | 29.2 | 47.5 | 56.8 | 60.3 | 55.5 | | | | 47.9 | 1+2 |
| Harder Direcs. | | | | | | | | (Based on 698 tested) | | | | | | | | | |
| 8 | 13 | If in the following words..... | | | | | | | | 40.6 | 68.1 | 59.3 | 58.7 | 52.5 | 76.3 | 67.0 | 3 |
| 5 | 14 | A list of words is given below. One of them is.. | | | | | | | | 46.9 | 47.4 | 57.1 | 58.7 | 55.7 | 83.0 | 66.5 | 3 |
| 6 | 15 | You are looking at a clock face.....at 3·45. | | | | | | | | 12.5 | 26.7 | 29.7 | 41.3 | 34.4 | 56.1 | 41.8 | 4 |

Name _____ Age _____ Grade _____

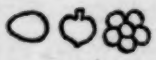
PINTNER-TOOPS REVISED DIRECTIONS TEST

Put a nose on this face:

Write 7 in the largest square: 

Put a dot below this line: ———

Cross out the blackest letter in TEXAS

Write g on the egg-shaped figure: 

Put the sign = where it belongs: 3+2 5.

Make a boy's name by adding one letter to Joh

Draw a line around the three dots .. ... ..

Now if Tuesday comes after Monday, make two crosses here ....., but if not, make a circle here ..... or else a square here .....

Show by a cross when the nights are longer: in summer?..... in winter?.....

Notice these two numbers: 3, 5. If iron is heavier than water, write the larger number here ....., but if iron is lighter write the smaller number here .....

Do nothing here (5+7=.....) unless you skipped the preceding question; but write the first letter of your first name and the last letter of your last name at the end of this line.

If in the following words e comes right after a more times than e comes just after i, then put a line under each word containing an e and an i, but if e comes just before a more times than right after i, then put a line under each word containing an a and an e:

receive feather teacher believe

A list of words is given below. One of them is needed to complete the thought in the following sentence: The roads became muddy when the snow.....

Do not put the missing word in the blank space left in the sentence, but put a cross below the word in the list which is next above the word needed in the sentence.

water

is

melted

snow

You are looking at a clock-face in a mirror. Place the hands of the clock at 3:45.

Figure 4.

Figure 4 shows the Revised Directions Test. The first eight directions are taken from the Easy Directions Test, the next four from the Hard Directions Test, and the last three are the three new harder directions which we have added.

The number of credits allotted to each direction is shown in the last column of Table XIII. This gives one point credit to the first eight directions and leaves the method of scoring these directions precisely as before. The details in regard to scoring have been explained above.

Two points credit are given to directions 9, 10, and 11, but *no partial credits are to be allowed.* These directions must be answered absolutely correctly in order to get a credit of 2; if not absolutely correct, *i. e.*, if partially correct, no credit whatever is allowed; a credit of 1 is never given to these directions. For direction 12 three credits are allowed, and these are divided into 1 and 2 credits, 1 for the first part of the direction and 2 for the second part. Each part must be absolutely correct in order to receive the partial credit of 1 or 2 as the case may be. The second part is always scored 2, for a correct response, or 0, for an incorrect response.

Directions 13 and 14 receive three points credit each, and no partial credits; the score is either 3 or 0. The correct response to direction 13 is the underlining of both "feather" and "teacher." The correct response to direction 14 is the placing of a cross (X or +) underneath the letters of the word, "is." No credit is allowed if the cross is on the word "melted;" it must be above this word. No credit is allowed if the word "melted" has been written in the incomplete sentence above, unless the word has been written in and crossed out again.

Direction 15 receives 4 points credit for an acceptable performance. An acceptable performance is interpreted as meaning that the minute hand on the diagram be drawn within one minute on either side of the figure, "9," and the hour hand shifted to the left anywhere up to the figure, "4;" *i. e.*, the hour hand must be shifted somewhat to the left in order to receive credit. No partial credit is allowed.

A method of procedure in giving the revised form of the directions test has not yet been standardized. In all probability the most feasible method will be to give as instructions to the subjects merely the words, "Fill this blank out according to directions. Do exactly what you are told to do on the paper," and to allow the subjects to

work at the test for a period of eight minutes. Each one is given as much time as he needs to complete the test, provided he does not exceed the time limit of eight minutes.

## Norms for the Revised Directions Test

The directions, selected and arranged in order of difficulty, are useless without norms. Now, it seems quite possible that the total score made upon any direction depends somewhat upon its position with reference to other directions; so that in the rearranged form we cannot be sure of the sentences receiving the same percentages at each age as in the original. The only adequate thing to do, of course, is to restandardize the new test, and we are at present working upon this standardization.

Realizing the immediate need for norms, we have adopted the following procedure to secure norms which are, we believe fairly accurate and will serve our purposes until more accurate norms are determined: (1), all papers were regraded on the basis of the selected sentences and the revised credits (2), the norms thus obtained from each of the several tests for each age were added to secure the norms for the entire revised test. Since not the same but different groups (in part at least) of children were tested on the three tests, our procedure may here be questioned. Our justification and the assumption underlying this procedure is this: The *median* child, from whatever group, within proper limitations, he may be selected, should make the same score as any *median child of his age* on the combined list. We, therefore, are justified in crediting the median child (who determines our norm) at any age, say 16, with the median score made by the median child of age 16, on the other two tests without testing him on those tests. This is the same principle as is used in the Binet Scale which credits the child with all tests below his basal age. We do not feel justified in establishing percentile scores on this basis. We, therefore, present the norms (medians or 50-percentiles) for the revised test in Table XIV, based on 2366 individual measurements.

TABLE XIV

*Tentative Norms for the Revised Directions Test*

| Test | Median Scores for Age— | | | | | | | | | | | | Superior |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | Adults |
| Easy Directions B | 1 | 3 | 6 | 7 | 8 | 8 | 8 | 8 | 8 | 8 | (8) | (8) | (8) |
| Hard Directions | (0) | (1) | 2 | 3 | 3 | 4 | 5 | 7 | 7 | 7 | 6 | 7 | 9 |
| Harder Directions | ... | ... | . | .. | 0 | 0 | (0) | (0) | 3 | 4 | 6 | 6 | 7 |
| Revised Test | 1 | 4 | 8 | 10 | 11 | 12 | 13 | 15 | 18 | 19 | 20 | 21 | 24 |

## SUMMARY

1. A standardization of the Woodworth and Wells Easy and Hard Directions Tests has been attempted. This standardization includes method of procedure, method of scoring and percentile norms for many ages.

2. An analysis of the relative difficulty of the directions in the two tests has been made, showing that many directions are of much the same degree of difficulty.

3. To secure one test covering a wider range of difficulty than any one of the original tests, a combination of the two tests as they are at present is not feasible.

4. A revised Directions Test has been constructed by choosing the most suitable directions from the original tests and by adding three other directions.

5. A method of scoring and tentative norms for the Revised Directions Test are offered.

# A COMPARISON OF TWO TYPES OF LEARNING BY MEANS OF A SUBSTITUTION TEST

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It is the purpose of this article to report the results of an investigation in which two types of learning have been compared. Such a comparison is made from four different standpoints: (1) By means of learning curves, (2) by a compilation of errors, (3) by means of retention tests, and (4) by means of transfer tests. In order to get data upon these four points, the following general plan has been used: (1) the subjects were divided into two groups, (2) all the conditions under which the two groups worked were the same with one exception, (3) the one factor which varied with the two sections was the method of learning.

## MATERIAL LEARNED

The material which was used is in the form of a substitution test. A brief description of this test was given by the author* some time ago. Later Baldwin† used the test upon delinquent girls, but no attempt was made by this writer to bring out the comparisons mentioned above. However, for the convenience of the reader it may be well to give a brief description of the test at this time.

Plate 1 shows one of the twelve sheets of the test. It will be noted that the letters of the alphabet are placed in a miscellaneous order at the top of the page and that each letter is accompanied by a number combination composed of two, three or four digits. In forming these combinations, only two different digits are used, namely, "1" and "2." In transcribing the material at the left of the page, it is understood that the digit "1" means a short horizontal line to the left of a given vertical line, while the digit "2" means a short horizontal line to the right of the vertical line. This phase of the test is made easy for the learner by the two expressions, "1 left" and "2 right," which are placed just beneath the alphabet. The vertical line is given in any case on the printed sheet. From the description which has been given, it will be seen that the letter H (12) is made with one stroke to the left and one to the right of the vertical while M (1221) takes the form left, right, right, left. Fur-

*Journal of Educational Psychology, Vol. IV., 293–297.

†Journal of Educational Psychology, Vol. IV., 317–332.

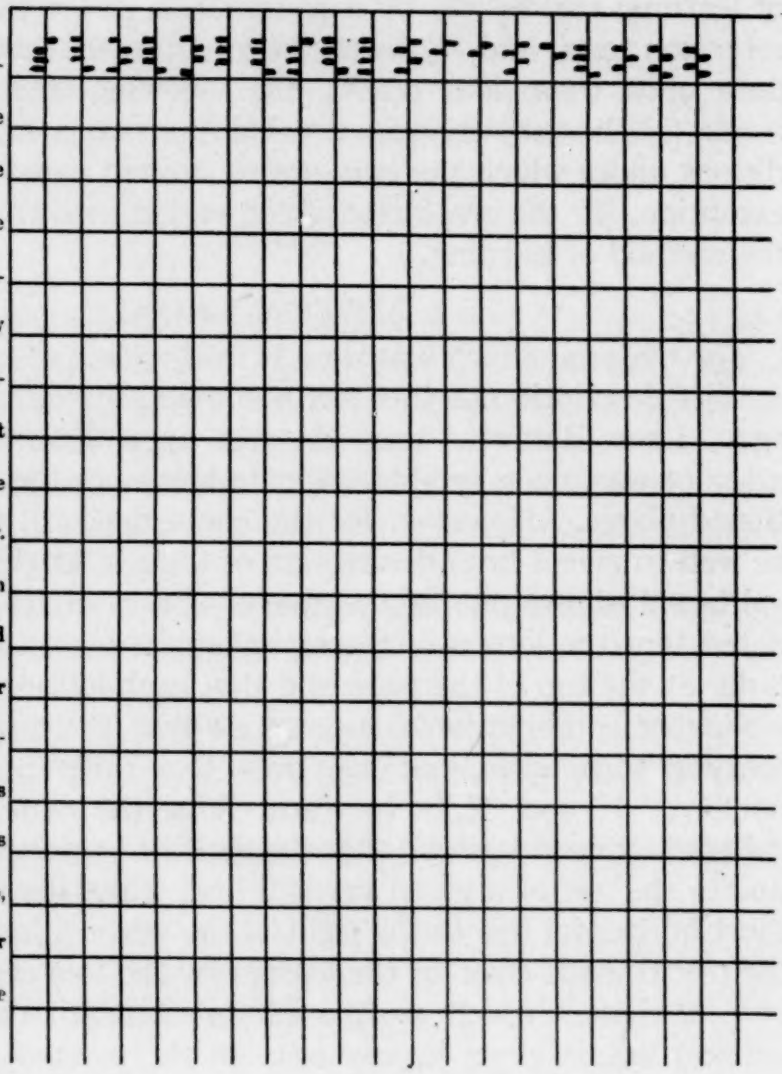
PLATE I

Z 2212 X 222 K 1211 G 1122 B 111 V 22 Q 212 J 122
P 211 W 221 F 1121 U 2122 L 1212 C 112 M 1221 Y 2211
D 1111 H 12 I 121 A 11 T 2121 E 1112 N 1222 S 2112 O 21 R 2111

X

1. LEFT 2. RIGHT

remembered, too, the ill-conditioned people whose disputes had been made part of his experience, the dogged children, cruel fathers, sullen husbands, angry wives, quarrelsome neighbors; and surely he did not err when he connected the two memories together. How many men and women go about pale-skinned and weak of limb because their physical health during infancy and childhood was not established by judicious management. It is just so, thought Frobel, with our minds. There would be



1761-1213-138-4476

ther illustrations may be found in Plate 1, where the first line of printed material has been transcribed into the code. Since the vertical line is given on the printed page, it is clear that the subject has only to put down the short horizontal lines. In making these short lines the subject begins near the top of the vertical line and the order in which the horizontal lines are put down is determined by the order of the digits in the number combinations which accompany the letters.

Another important feature of the test is that the number combinations are made up according to a definite system. This plan shows itself clearly when the letters are arranged in their alphabetical order, as follows:

| (1) | (2) | (3) | (4) |
|---|---|---|---|
| A 11 | H 12 | O 21 | V 22 |
| B 111 | I 121 | P 221 | W 221 |
| C 112 | J 122 | Q 212 | X 222 |
| D 1111 | K 1211 | R 2111 | Y 2211 |
| E 1112 | L 1212 | S 2112 | Z 2212 |
| F 1121 | M 1221 | T 2121 | |
| G 1122 | N 1222 | U 2122 | |

From the above, it is clear that the alphabet is divided into four groups. In groups one, two, and three, there are seven letters each, while in group four, there are only five letters. In group one, each letter in the code begins with "11" and each combination after the first is formed by adding "1," "2," "11," "12," "21," or "22" in the order just given, to the "base " combination "11." In group two, each letter in the code begins with "12," and the combinations after the first are formed by making the same additions to the base "12" as were noted in group one. Groups three and four are very similar to groups one and two, and no further explanation of them is necessary. It is also important to note that the word "AHOV" gives the letters with which each of the four groups begins.

## SUBJECTS

The work with this test covers a period of four years. In this time, about four hundred subjects have taken part in the experiment. These persons were all university students who did the work as a required laboratory exercise under the direction of the author. As a check upon this laboratory work, forty persons have taken the test under the most careful experimental conditions. The results obtained from this group of forty did not differ in any essential way

from the earlier results, and it was not deemed necessary to carry the second type of work further. The entire group of forty did not take the test at the same time. They were divided into four sections on account of the greater ease with which it is possible to deal with a small number of subjects in such work. With the exception of certain check experiments, the results given in the pages following are taken entirely from this group of forty.

## Methods of Learning

The test has been given in two different ways, which may be spoken of as Method I. and Method II. Those who worked according to Method I. had the printed sheet, as shown in Plate 1, before them at all times. This plan gave the subjects opportunity for reference to the code at the top of the page. The explanations and directions which it is necessary to give to the learner working according to such a method are very simple. It is sufficient for the subject to understand that each letter has standing for it certain digits, and that these digits are to be translated into short horizontal lines.

In the second method, the tops of the sheets were torn off across the perforated line (X) as indicated in Plate I. Those who worked according to this plan had the organization of the code explained to them. In making the explanation, the alphabet was placed on the blackboard and attention was called to the four groups of letters, to the "base" digits, to the additions made to the "base" digits, and to the word "AHOV." After the explanation had been given, and all questions answered, the subjects were given four minutes to study the plan or organization of the code. Before the subjects began this study period, emphasis was put on the fact that they were not to attempt to memorize the individual letters, but rather that attention should be given to the general plan underlying the code. Immediately after the study period, the experiment was begun.

All other phases of the methods were the same for each of the groups. The time spent was twenty minutes each day for twelve days. A record was kept of the five-minute periods. This was done by having a timekeeper call time at the end of each five-minute period. The subjects then made a mark at the point where they were working. In order that the experiment might have some motive, it was given after the learning curve had been discussed in class. As a result of this discussion, the general purpose of the experiment was understood, and most students showed a genuine interest in the work.

It is also of interest at this place, to compare the two types of learning. It is evident that the two methods are alike in that each requires such mental activities as memory, association, and the rational processes. The essential difference seems to lie in the fact that Method I. requires the learning of the letters as separate and distinct entities, while Method II. requires that the different letters be learned as parts of an intricate system which brings into relation all the letters of the alphabet. In other words, it may be said that Method II. requires the rational processes in a higher degree than does Method I.

It may be well to point out in this connection that Method I. parallels the so-called mechanical work of the school, while Method II. parallels the so-called rational work. Much has been written concerning these types of work, but very few suggestions have been made for a correct evaluation of them. Such experiments as the present one give certain indications, at least, as to their relative values, and it is hoped that a parallel experiment in one of the common branches can be carried out in the near future.

## RESULTS

Plate II shows a number of typical learning curves. The solid lines are curves made from the results of those working by Method I., while the dotted lines are the results of Method II. These curves have been selected for two purposes: (1) To show the extremes of the distribution of the different abilities brought out by the experiment, and (2) to make possible a comparison of curves which show about the same proficiency at the end of the training period.

In regard to (1) attention may be called to the fact that the upper limit of the distribution (Curves A and B) was attained by representatives of each of the methods, while the lower limit (Curve E) was passed by all those who used Method I. Five subjects, all of whom showed about the same ability as that in Curve E, were recorded. All of these used Method II. One of the poorest records made by Method I. is shown in Curve D.

The above results show clearly that Method II. makes for a wider distribution of ability than does Method I. If this fact is translated into terms of teaching activities, it probably means that the teacher who rationalizes her work will have a greater per cent. of failures than the teacher who does not so rationalize her work. If this point can be established, it will introduce a new factor into the distribution of grades. That is, if the grades of a teacher do not conform to

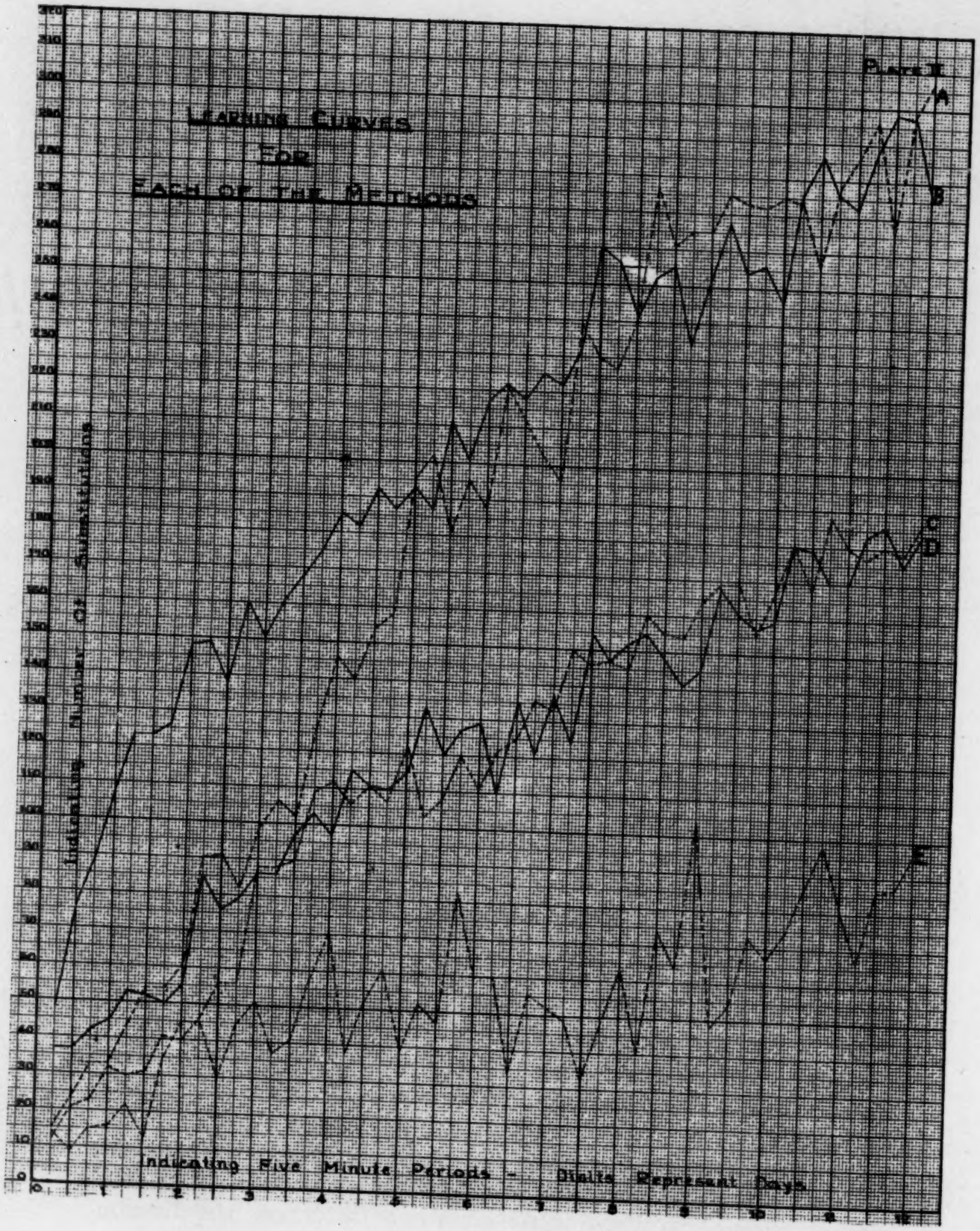


Plate II
Learning Curves
For
Each of the Methods
A
B
C
D
E
No. Repetitions Required
Indicating Five Minute Periods - Digits Represent Days

standards set for her, the results noted above give a basis for an explanation of the variation from the standard.

A comparison of Curves A and B shows that A begins lower than does B, and remains so until the fifth day, when the two curves cross. After this point they cross and recross until the end of the learning period. This same point is brought out in Curves C and D. Here the first crossing takes place on the third day after which the two curves cross and recross several times. This difference in the early parts of the curves is due, doubtless, to the fact that Method II. is more difficult in the beginning than is Method I.

A further study of Curves A and B shows a sudden rise in A on the third and fourth days, while a similar rise is to be noticed in Curve B on the first and second days. This same point is also shown in Curves C and D. This postponing of a rise in Curves A and C is evidently due to the fact that up to this period the time is consumed in a mastery of the organization of the code and the memorization of it. This means that Method II. requires a preliminary period of considerable length for adjustment before the progress of the learning shows in an objective way. In Method I. no such preliminary period is necessary, or if it is present, it is much shorter in duration. For certain subjects who worked by Method II. this preliminary period was lengthened and became a period of very great discouragement. During this period, not a few expressed themselves as desiring to discontinue the experiment. Their excuse was that they seemed unable to make progress.

In view of the large differences which were found to exist in the ability of the different subjects, it was thought worth while to compare certain individuals in each group, by means of other tests. Three different tests were given for this purpose. These were Thorndike's Association Test*, a test for the span of attention by means of Whipple's† revolving tachistiscope, and the tapping test.†† In selecting these tests, it was assumed that the ability to associate readily along with a wide span of attention and rapid motor reactions would make for efficiency in this experiment. These tests are so well understood that no further explanations are necessary except to say that the time allowed for study of the association test by the subject was two minutes, and that the tapping was done for thirty seconds. Table 1 gives results for the three individuals who did exceedingly well in the original experiment, three taken at random from those who showed mediocre ability, and three of the five who did most poorly in the work.

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*_Educational Diagnosis_, Science N. S. 37 No. 943, 133–142.

†_Manual of Mental and Physical Tests, Simpler Processes_, Page 265

††_Manual of Mental and Physical Tests, Simpler Processes_, Page 130.

TABLE 1.

*Results in Auxiliary Tests*

| Association Test | Span of Attention | Tapping Test | |
|---|---|---|---|
| (1) 100 | 4 plus | 6.7 | |
| (2) 60 | 4 | 7.0 | High (1) |
| (3) 100 | 4 plus | 8.1 | |
| Av. 86.6 | 4 plus | 7.2 | |
| (4) 100 | 4 minus | 5.5 | |
| (5) 70 | 4 | 6.8 | Mediocre (2) |
| (6) 65 | 5 | 5.5 | |
| Av. 78.3 | 4.3 minus | 5.9 | |
| (7) 80 | 4 | 8.4 | |
| (8) 32 | 3 plus | 5.8 | Low (3) |
| (9) 60 | 4 | 5.6 | |
| Av. 57.3 | 3.6 plus | 6.6 | |

In considering these results, it will be noted that each of the individuals in group (1) stands high in all the tests, with the exception of No. 2, who is low in the association test. The low score in this one test may be accounted for by the fact that this individual failed to adjust herself readily to the experiment, and therefore did not do herself justice. In the middle group, it will be seen that each individual stands low in one or more of the tests. To illustrate, individual 4 has a span of attention, a little less than 4 and his rate of tapping is 5.5. Individual 6 is low in both the association test and the tapping test. In group (3), there are large individual variations in all the tests. It is rather interesting to note that the highest tapping rate is made by an individual in this group, and that the lowest score in both the association test and the span of attention test, is also made by an individual in this group.

If averages are considered, it is clear that the highest average in the association test is made by the upper group, that the next highest is made by the middle group, and that the lowest score is made by the last group. The correlation between this test and the results of the experiment can be accounted for by the fact that in learning the substitution test, ability to build up associations is used in a large degree until the test is completely mastered. In the

tapping and span of attention tests, the correlation is not so high as that just noted. This is probably due to the fact that in the substitution test, neither the entire span of attention nor the full motor ability is used at all times in the work.

## Motor Test

The introspections of certain subjects who took part in the experiment indicated that a large part of the learning was motor in its nature, that is, more work could be done in five minutes near the end of the experiment because the subject was physically able to put down more marks to the right and to the left of a vertical line. While this point does not bear directly upon the comparisons to be made here, yet it throws light upon the learning involved in the experiment and for this reason data upon the question are given.

In order to get results upon this phase of the learning, the group of forty subjects mentioned before carried along with the regular work of the experiment, what may be spoken of as a motor test. This test consisted in making short horizontal lines on alternate sides of a vertical line for ten seconds each day before the regular experiment began. The period was made short in order that the practice element in the motor test might be as small as possible. Typical results of this test are given in Table 2.

TABLE 2.

*Results for Motor Test*

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1st day | 28 | 27 | 27 | 27 | 24 | 16 | 27 | 33 | 18 | 24 | 26 | 21 |
| 2nd " | 33 | 27 | 29 | 21 | 41 | 23 | 29 | 40 | 24 | 28 | 48 | 26 |
| 3rd " | 32 | 27 | 34 | 26 | 41 | 23 | 36 | 58 | 25 | 34 | 49 | 26 |
| 4th " | 23 | 35 | 39 | 29 | 45 | 24 | 33 | 64 | 27 | 36 | 45 | 34 |
| 5th " | 35 | 36 | 47 | 31 | 48 | 27 | 37 | 58 | 30 | 40 | 44 | 42 |
| 6th " | 33 | 31 | 48 | 32 | 53 | 36 | 34 | 56 | 30 | 40 | 52 | 39 |
| 7th " | 36 | 34 | 49 | 29 | 49 | 31 | 37 | 52 | 28 | 40 | 54 | 43 |
| 8th " | 36 | 28 | 50 | 40 | 57 | 31 | 40 | 65 | 26 | 42 | 54 | 40 |
| 9th " | 34 | 31 | 46 | 40 | 53 | 34 | 46 | 55 | 29 | 47 | 56 | 39 |
| 10th " | 40 | 38 | 54 | 39 | 59 | 32 | 49 | 66 | 30 | 50 | 39 | 47 |
| 11th " | 36 | 38 | 56 | 42 | 54 | 40 | 48 | 65 | 32 | 50 | 51 | 47 |
| 12th " | 37 | 44 | 56 | 49 | 58 | 40 | 55 | 63 | 32 | 48 | 64 | 51 |
| A) 33.5 | 33.0 | 44.5 | 33.9 | 48.1 | 29.7 | 39.2 | 56.2 | 27.5 | 39.9 | 50.1 | 37.9 | |
| (B) 34 | 48 | 84 | 77 | 64 | 87 | 72 | 56 | 34 | 72 | 55 | 98 | |
| C) 204 | 313 | 269 | 214 | 236 | 317 | 606 | 776 | 403 | 525 | 490 | 816 | |

Each column is the record of one individual. The row of figures indicated by the letter A at the bottom of Table II, gives the average number of strokes made for the twelve days. This varies from 27.5 to 50.1. Row B gives the per cent. of increase made in the motor test. This per cent. is based upon the average of the highest three and of the lowest three records. The numbers in the row indicate by the letter C give the per cent. of increase made in the substitution test. This increase is based upon the averages of the highest six and the lowest six records made in this test. If the per cent. of increase in the bottom row may be thought of as an increase due to both motor learning and intellectual learning, then the results in Row B may be thought of as due to motor learning alone. It is not good psychology to subtract one average from the other and say that the difference represents mental learning; yet it is safe to say that a large part of the learning is motor in its nature.

Column (1) is the record for the individual represented in Curve A, in Plate II. This individual complained that her hand was in her road. Column (2) is the record of a slow individual who complained that she could not learn the plan of Method II.

As a check upon this work, thirty subjects took the motor test once before they began the experiment and a second time after they had finished. These results show the increase in motor ability due to the practice of the experiment alone, without the practice of the motor test being introduced. Per cents of increase for fifteen persons taken at random from this group are as follows: 44, 24, 30, 14, 26, 47, 55, 36, 21, 34, 52, 46, 63, 142, 178. The average of the above is fifty-four per cent. This is eleven points lower than the average of the results in Row B of Table 2. This shows that a part of the increase to be found in Table 2 is due to the daily practice period, of ten seconds, yet the results in Table 2 are not to be considered as invalidated. In other words, the conclusion holds that a considerable portion of the learning in the substitution test is motor in its nature.

### A Comparison of Errors Made in the Two Methods

It was thought worth while to go over a number of the records made in the substitution test in order to check the errors made. The errors found consisted in the omission of letters and in mistakes in putting down the short horizontal marks. In the beginning of the experiment, no emphasis was put upon the fact that the records would be checked for errors. Table 3 gives typical results

TABLE 3.

*Showing Errors Made in Each Method*

| | Method I. | | | | | Method II. | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| 1st day | 2 | 1 | 2 | 6 | 4 | 0 | 16 | 11 | 13 | 2 |
| 2nd " | 3 | 8 | 0 | 0 | 5 | 0 | 36 | 4 | 8 | 7 |
| 3rd " | 5 | 2 | 2 | 3 | 0 | 3 | 6 | 0 | 7 | 2 |
| 4th " | 2 | 1 | 7 | 2 | 4 | 0 | 1 | 4 | 11 | 68 |
| 5th " | 5 | 3 | 2 | 0 | 6 | 2 | 3 | 2 | 1 | 2 |
| 6th " | 3 | 0 | 2 | 3 | 0 | 4 | 5 | 4 | 2 | 16 |
| 7th " | 4 | 16 | 3 | 1 | 3 | 5 | 2 | 5 | 1 | 2 |
| 8th " | 4 | 2 | 2 | 2 | 6 | 7 | 1 | 6 | 0 | 5 |
| 9th " | 1 | 4 | 6 | 0 | 3 | 9 | 0 | 0 | 0 | 4 |
| 10th " | 7 | 1 | 1 | 3 | 2 | 2 | 7 | 0 | 4 | 11 |
| 11th " | 7 | 2 | 1 | 3 | 1 | 2 | 0 | 1 | 0 | 5 |
| 12th " | 4 | 1 | 1 | 8 | 2 | 5 | 1 | 6 | 9 | 7 |
| Total Errors | 47 | 40 | 29 | 31 | 36 | 39 | 78 | 43 | 47 | 120 |

in this work. The columns numbered (1), (2), etc. show the number of errors made by different subjects on the twelve days of the test.

The general conclusion to be reached here is that in the earlier periods of the training there are more errors made in Method II. than in Method I. A rather marked exception to this is the record in column 6. In the later part of the experiment there is very little difference in the number of errors shown in the two methods. In other words, the two methods give about equal results in accuracy at the end of the training period.

The large number of errors made in Method II. at the beginning of the experiment is due to the fact that this type of work is entirely mental, while in Method I. there is opportunity for reference to the code at the top of the test sheet. It is apparent that as the subject becomes more and more familiar with the code in Method II., the errors will be reduced and at the end of the training period there is little, if any, reason why one method should afford more errors than the other.

## Retention Tests

Attention has been called to the fact that those working by Method II. met certain rather serious difficulties at the beginning of the experiment.

It is also true that Method II. requires much greater mental effort than Method I. This was clearly shown by the wrinkled brows, the complaints of headache, and remarks concerning the close concentration required by the work. This does not imply that those who worked by Method I. did not put their best efforts into the experience, but rather that they were not put to the same severe mental strain as those who worked by Method II.

The question may now be raised as to whether there is any compensation for this period of discouragement and the extra effort required by Method II. This point was dealt with by means of a retention test. The first test used in this phase of the work consisted in having the subjects write the alphabet in the code as quickly as possible two weeks after the experiment was completed. This test was found unsatisfactory because there were always letters which those working by Method I. had not memorized. These letters could not be put down in the retention test; yet, in carrying out the experiment, there seemed to be a motor habit of the eye, which enabled the subject to locate such letters very quickly in the alphabet at the top of the page.

This type of test was also found unsatisfactory because no time limit could be established. If the time was made short, very few would finish the alphabet, and if the time was made longer, then all those who had worked by Method II. would finish the entire alphabet on account of the relations existing among the various letters.

A second type of retention test consisted in having all subjects work upon the regular test for ten minutes. The first time this test was given, the tops of the sheets were torn off for all subjects, but this was found to be unsatisfactory again on account of certain letters not being memorized, as was explained above.

The test finally used, consisted in having the subjects do a certain part of the test in the same way that the regular experiment was carried out. The subjects did not know that such a test was to be given, so that there was no voluntary effort at retention. The time given to the test was ten minutes, and the record was kept in five-minute periods, as in the regular experiment. The period which elapsed between the end of the regular experiment and the retention test was two weeks. Table 4 gives typical results in this test:

Column 1 under both methods, gives the average for the highest six records made in the regular experiment as mentioned previously, while column 2 shows the average for the two five-minute periods of

TABLE 4.

*Results for Retenion Tests*

| Method I. | | | Method II. | | |
|---|---|---|---|---|---|
| (1) | (2) | (3) | (1) | (2) | (3) |
| 175.5 | 136.0 | 22 | 189.0 | 142.5 | 24 |
| 140.5 | 64.5 | 54 | 142.5 | 114.0 | 20 |
| 164.3 | 68.0 | 58 | 198.5 | 172.0 | 13 |
| 166.5 | 70.0 | 58 | 313.0 | 284.5 | 9 |
| 147.2 | 75.0 | 49 | 111.5 | 31.5 | 44 |
| 172.5 | 112.5 | 34 | 75.5 | 61.5 | 18 |
| 123.0 | 50.5 | 59 | 116.5 | 83.5 | 28 |
| 148.0 | 105.0 | 29 | 151.6 | 113.5 | 25 |
| 152.8 | 132.5 | 13 | 136.0 | 84.5 | 38 |
| 217.5 | 184.0 | 15 | 109.0 | 66.5 | 39 |
| 211.0 | 171.5 | 18 | 140.0 | 114.5 | 18 |
| | | Av. 37.1 | | | Av. 25.0 |

the retention test. Column 3 gives the loss in per cent. for each of the methods. The average of the different losses for Method I, is 37.1, while the average for Method II. is 25.0. Thus Method II. has a distinct advantage over Method I. in this part of the work. This is probably due to the fact that the extra effort required by Method II. brings the learning to a higher level than does Method I.

## TRANSFER TESTS

Another method of comparing the two types of learning consists in determining the amount of transfer from the training given in the substitution test here used, to other tests of the same type. Those who worked by Method I. did ten minutes of work upon Dearborn's* test before they began the twelve days' training, while those who worked Method II. worked for ten minutes upon a test used by Goddard.†

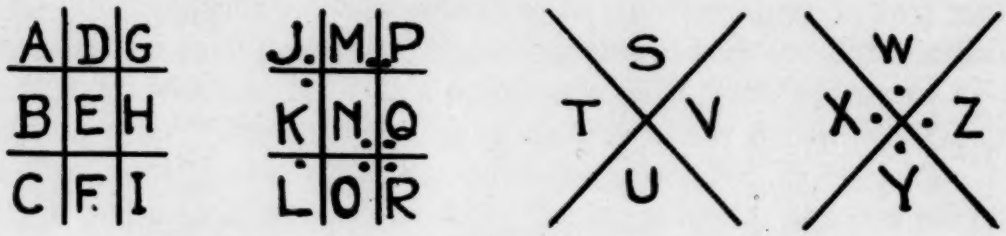
The Dearborn test consists in transcribing letters into digits. Each letter of the alphabet along with the number which stands for it is placed in a circle: thus

*Psy. Rev. Mon. Sup. Vol. 13.

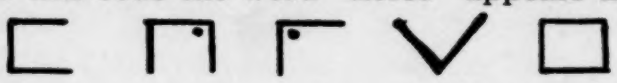
†HOLMES. *School Organization and the Individual Child*, Page 108.

The circles with the letters and numbers included are grouped together in a miscellaneous order at the top of the test sheet. These headings were clipped from the original sheets and pasted on the sheets of the substitution test used in the present experiment. This was done in order that all the material to be translated might be homogeneous.

The Goddard Test is as follows:




According to this code the word "horse" appears thus:



This code was made out upon slips of paper and used in the manner just indicated for the Dearborn Test.

After the training period, the Dearborn and Goddard tests were given a second time in order to determine the increase. Tables 4a and 5 give typical results in this work.

TABLE 4a.

*Increase Shown in Dearborn Test After Practice in Method I.*

| B. P. | A. P. | Per Cent of Increase |
|---|---|---|
| 104.0 | 118.0 | 13 |
| 107.0 | 115.0 | 7 |
| 103.0 | 128.0 | 24 |
| 154.0 | 171.0 | 11 |
| 88.0 | 111.5 | 26 |
| 90.0 | 116.0 | 29 |
| 87.5 | 113.5 | 52 |
| 101.5 | 133.5 | 31 |
| 45.5 | 82.5 | 81 |
| 72.0 | 104.5 | 45 |
| | Av. | 31.9 |

In the above tables, the column headed B. P. shows the number of substitutions made in the test before practice, the column headed A. P. gives the number of substitutions after practice, and the third column gives the per cent. of increase.

If the averages are considered, the training in Method II. is seen to result in greater transfer than Method I.

TABLE 5.

*Increase Shown in Goddard Tests after Practice in Method II.*

| B. P. | A. P. | Per Cent of Increase |
|---|---|---|
| 59.0 | 93.5 | 58.5 |
| 52.5 | 87.5 | 66.6 |
| 46.5 | 56.0 | 20.4 |
| 39.0 | 43.5 | 11.5 |
| 30.5 | 43.5 | 42.6 |
| 36.5 | 62.0 | 69.0 |
| 37.0 | 72.0 | 94.6 |
| 33.5 | 51.0 | 52.2 |
| 28.5 | 43.0 | 50.9 |
| | Av. | 51.9 |

TABLE 6.

*Showing Increase in Dearborn Test without Practice after an Interval of Twelve Days*

| B. I. | A. I. | Increase in Per Cent. |
|---|---|---|
| 118.0 | 152.0 | 28.2 |
| 92.5 | 118.5 | 25.9 |
| 86.5 | 96.5 | 11.5 |
| 95.0 | 125.0 | 31.5 |
| 94.5 | 114.5 | 21.1 |
| 87 0 | 109.0 | 25.2 |
| 111.0 | 135.0 | 21.6 |
| 94.5 | 101.5 | 7.4 |
| 77.0 | 99.0 | 28.5 |
| 47.5 | 69.5 | 46.3 |
| | Av. | 24.7 |

TABLE 7.

*Showing Increase in Goddard Test without Practice after an Interval of Twelve Days*

| B. I. | A. I. | Increase in Per Cent. |
|---|---|---|
| 76.0 | 84.0 | 10.5 |
| 100.0 | 127.0 | 27.0 |
| 54.0 | 81.0 | 61.1 |
| 99.0 | 135.0 | 39.1 |
| 83.0 | 87.0 | 4.8 |
| 20.5 | 35.5 | 73.1 |
| 28.5 | 59.5 | 75.0 |
| 57.0 | 64.0 | 12.1 |
| 35.0 | 46.0 | 31.4 |
| 47.0 | 55.0 | 17.0 |
| | Av. | 35.1 |

A part of the increase indicated in Tables 4a and 5 would have taken place if no practice had been given. In order to check up on this, control sections took the Dearborn and Goddard tests before and after an interval of twelve days with no practice. Results of this work are given in Tables 6 and 7.

The column indicated by B. I. gives the number of substitutions before the interval, and the one indicated by A. I. gives the number of substitutions after the interval, and the third column shows the increase in per cent. The average increase from the Dearborn test is 24.7 per cent., and that from the Goddard test is 35.1 per cent. The greater increase in the Goddard test is probably due to two things: (1) Since there are just two periods of work, and since those using this test began lower on the average, they have a possibility of going higher in the second period of work, and (2) the Goddard test requires greater concentration of mind, and it is probably true that this concentration gives better results.

If the average of the results of the Dearborn test in Table 6 is taken form the average in Table 4a (31.5–24.7), the result is 7.8 per cent, and if the average of the Goddard test in Table 7 is taken from the average in Table 5 (51.0—35.1), the result is 16.8 per cent., which gives the training by Method II. a decided advantage.

It is interesting to attempt an explanation of the greater transfer in Method II by means of the different theories of transfer which have been proposed. It is difficult to see how Thorndike's* theory of identical elements can explain the difference, because it would appear that there are as many common elements in one case as in the other. It is also difficult to see how Bagley's** theory of ideals can apply to either of these methods because ideals have little, if anything, to do with such work.

On the other hand, Angell's† theory of attention gives some basis for an explanation. It has been pointed out that Method II. requires greater mental effort than Method I., and it seems entirely possible that this training in attention may account for the greater transfer in Method II. It is also true that Method II. requires the higher mental processes to a greater degree than does Method I, and it may be that certain generalizations are required in Method II. which enhance the transfer in this method. This explanation would correspond to Judd's†† theory of transfer.

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*Pys. R. 8, 247–261; 348–395; 553–564.

***Educative Process.* Chap. 13, page 208.

†Ed. Rev. June, 1908.

††Ed. Rev. June. 1908.

# THE ECONOMIC STANDING OF PARENTS AND THE INTELLIGENCE OF THEIR CHILDREN

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## I. Purpose

While the vanguard of the students of heredity and of educational psychology have gone forward with their inquiries into the relative importance of nature and nurture in determining the mental life of children, a very considerable body of social workers, teachers, and students, have failed to acknowledge the fundamental premise of these studies and hence, even at the present time, the problem persists as to whether more intelligent and wealthier parents do have, in the long run, more intelligent children. Some who maintain the affirmative have ascribed the superior intelligence of the offspring to heredity; some have believed early environment all-powerful; but a third group, less clearly recognized, has tended to view dubiously the entire proposition that children do vary with the standing of their parents. This group has emphasized the instances wherein great leadership or genius has apparently arisen from obscure parentage amidst abject poverty; they discredit family trees on the one hand and discount the effect of economic surroundings on the other hand.

The purpose of the following inquiry was simply to attempt, by a brief survey, to find whether any clear indication would appear of a correlation between intelligence of children, measured crudely by school advancement, and the economic standing of the parents, measured still more crudely. It was not proposed to make a comparative study of the influence of heredity and environment, but to ascertain what light might be thrown upon the position held by the third group mentioned above—the position, namely, that the economic attainment of parents (and hence also their degree of intelligence) is not definitely associated with the "brightness" of their children. Our question then is: Do poorer parents on the whole have less advanced children; do wealthier parents have more advanced children?

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*A study made in connection with a research course under Prof. Roswell H. Johnson at the University of Pittsburgh.

## II. METHOD

As an index for the measurement of the intelligence of children their school advancement was employed, an index well justified by the close association which has been repeatedly demonstrated between it and a ranking based on individual mental tests. Only three class divisions were used which we shall call Retarded, Normal, and Advanced. Normal was used to signify that the individual's actual school grade (to the half year) is the same as, or within one half year of, his theoretically normal school grade; Retarded to signify his actual grade to be one year or more under the theoretically normal; and Advanced one year or more above the theoretically normal. That is:

| | |
|---|---|
| Retarded: | (Age to nearest ½ year—6) ± ½ > Actual School Grade |
| Normal: | (Age to nearest ½ year—6) ± ½ = Actual School Grade |
| Advanced: | (Age to nearest ½ year—6) ± ½ < Actual School Grade |

In reckoning actual school grade, grade 1A = 1 year, grade 1B = ½ year, etc. For example, if X was born in January 1906 and his grade consulted in March 1917 was found to be 6B (equal to 5½), then $(11-6) \pm ½ = 5½$. Hence X is Normal.

It was found that this method of ranking gave a more nearly normal distribution than any other tried and it also seemed most frequently justified in individual cases as actually indicating whether the child had failed of promotion at least once, in the case of Retarded, or had succeeded in advancing by double promotion, in the case of Advancement.

As an index for the measurement of economic standing it was desired to find a means of roughly dividing the parents into two groups—more wealthy and less wealthy. The possession of telephones was hit upon as a simple, readily accessible, and withal fairly trustworthy, indication of economic and social status. Both theoretically and empirically it was found that the possession of a telephone is rather reliable evidence that the parents have succeeded in attaining considerable economic independence and hence also that they are of comparatively high grade natural ability. Similarly absence of telephones points to a much less advanced social position and hence presumably to a comparatively lower grade of heredity constitution. In those numerous cases where the economic margin of surplus is such that telephones might or might not be had, in most instances, it would seem, the determining factor for such possession would be cultural attainment or comparative im-

portance of work, thus bringing these marginal cases into their proper significance in our inquiry. The use of this index is further justified by the actual results obtained as to the distribution of telephones, as will appear under our results.

The material to which our standards were now applied was a group of one thousand school children of Pittsburgh, distributed in five public schools. The five schools were chosen to be as representative as possible of different social settings: Grant and Ralston are in very poor districts with many laborers, day workers, street venders, etc; Bellefield and Shakespeare are in districts considerably more prosperous though by no means wealthy, populated to a considerable extent by artisans, small shop-keepers, boarding-house proprietors, etc.; Linden is one of the most wealthy districts of the city, drawing mainly from families in very comfortable circumstances or better. The significance of these differences both as to advancement of children and possession of telephones will be evident below.

The necessary data were obtained from the Permanent Record Cards of the pupils in each school together with reference in each case to the two city telephone directories. No children whose parents' present address was not definitely ascertainable were taken; all pupils entering in the current year as well as all kindergarten pupils were omitted; and in general precautions were observed to make the results as trustworthy as possible.

## III. Results

TABLE I.

*Distribution of 1000 School Children as Retarded, Normal, and Advanced*

| | Individuals | | | | Per Cent. | | |
|---|---|---|---|---|---|---|---|
| School | Retarded | Normal | Advanced | Total | Retarded | Normal | Advanced |
| Grant | 47 | 49 | 8 | 104 | 45.2% | 47.1% | 7.7% |
| Ralston | 25 | 38 | 5 | 68 | 36.7 | 55.9 | 7.4 |
| Bellefield | 122 | 209 | 84 | 415 | 29.4 | 50.4 | 20.2 |
| Shakespeare | 78 | 140 | 53 | 271 | 28.8 | 51.7 | 19.6 |
| Linden | 18 | 89 | 35 | 142 | 12.7 | 62.7 | 24.6 |
| Totals | 290 | 525 | 185 | 1000 | 29.0 | 52.5 | 18.5 |

In Table I are presented the general class distributions of the different schools and the totals both by count of individuals and by per cents. The percentage distribution in the schools is in striking agreement with what might be expected from the economic con-

dition of the respective districts. Grant and Ralston show a very large proportion of Retarded with an almost negligible number of Advanced; Bellefield and Shakespeare have the most nearly normal distribution of Retarded and Advanced; Linden shows the opposite tendency from the first two schools, a very small proportion of Retarded and with a comparatively large percentage of Advanced pupils; Linden shows the opposite tendency from the first two schools, a very small proportion of Retarded with a comparatively large percentage of Advanced pupils. This data in itself gives some indication of the marked association between economic status and school advancement and undoubtedly would be much more striking if the different schools had a system of uniform grading, for there can be no question that there is a tendency for the general lower ability in the poor school to be compensated by a general lower standard of grading and vice versa in the wealthier school.

TABLE II.

*Distribution of Telephones among the Same 1000 Children*

| School | Number of each class having telephones | | | | Per cent of each class having telephones | | | |
|---|---|---|---|---|---|---|---|---|
| | Retarded | Normal | Advanced | Total | Retarded | Normal | Advanced | Total |
| Grant | 3 | 3 | 3 | 9 | 6.3% | 6.1% | 37.5% | 8.6% |
| Ralston | 3 | 2 | 1 | 6 | 12.0 | 5.3 | 20.0 | 8.8 |
| Bellefield | 28 | 64 | 38 | 130 | 22.9 | 30.6 | 45.2 | 31.3 |
| Shakespeare | 12 | 42 | 23 | 77 | 15.4 | 30.0 | 43.4 | 28.4 |
| Linden | 10 | 57 | 27 | 94 | 55.5 | 64.0 | 77.1 | 66.2 |
| Totals | 56 | 168 | 92 | 316 | | | | |

Table II presents the distribution of telephones among the 1000 individual studied, again according to school and also according to the class (Retarded, Normal, Advanced) of the pupils. The total percentages of telephones show how definitely the districts are ty pified by this index, the range being from 8 per cent. to 9 per cent. in Grant and Ralston to 66.2 per cent. in Linden, with the other two schools set well off in the interval at about 30 per cent. The general tendency in the distribution of telephones among the classes is also clear, the last three schools presenting marked differences between each two classes. In the case of Grant and Ralston the difference

between the percentages of Advanced and Retarded having telephones is equally definite. The slight discrepancy in these schools between the proportions of Retarded and Normal possessing telephones is readily explainable by reason of the very few cases here involved (the fewest occurring throughout the tables).

TABLE III.

*Per Cent of Class Totals Having Telephones*

| Retarded | Normal | Advanced | Totals |
|---|---|---|---|
| 19.3% | 32.0% | 49.7% | 31.6% |

In Table III are summed up the few most significant percentages of the foregoing data. It is found that in the entire 1000 cases telephones are possessed by 31.6 per cent.; in the entire class of pupils in their Normal grade 32.0 per cent. have telephones, a percentage almost identical with that of the totals. In contrast to this similarity is the variation shown in the per cent. of Retarded children having telephones, 19.3 per cent., and of Advanced children having telephones, 49.7 per cent. Evidently a real association does exist in this case between Retarded Grade and Absence of Telephones and between Advanced Grade and Presence of Telephones.

In order to combine this association into a single approximate coefficient the four classes Advanced and Telephones, Advanced and Not Telephones, Retarded and Telephones, Retarded and Not Telephones, were utilized in the simple association formula of Yule, resulting as seen in Table IV in a positive association coefficient of .61.

TABLE IV.

*Coefficient of Association of School Standing and Possession of Telephones*$=+.61$

$$\text{Formula, } Q=\frac{N.\,\delta.}{(AB)\,(ab)+(Ab)\,(aB)}$$

(Cf. Yule: "Introduction to the Theory of Statistics", p. 38)

## IV. Conclusions

In a few words we may summarize these results:

1. The proportion of families possessing telephones is markedly greater as the district studied is wealthier.

2. The proportion of school children who are advanced is markedly greater as the district studied is wealthier (despite the compensatory tendency of the grading).

3. In every district studied the tendency is for the percentage of Advanced pupils having telephones to be greater than that for the Normal and still greater than that for the Retarded.

4. The percentages of the respective class totals having telephones are approximately 19 per cent. of the Retarded, 32 per cent. of the Normál, 50 per cent. of the Advanced.

5. The coefficient of association between advanced grade and telephones and retarded grade and not telephones is +.61.

If, now, we can accept the indices used to actually represent parental attainment and intelligence of offspring respectively, and there appears ample justification for doing so in a general way, we may indicate the following few conclusions and comments:

6. The percentage of Advanced children coming from homes better stiuated economically is clearly very considerably greater than the percentage coming from homes that are poorer, and this applies as between the rich and middle class as well as between the extremes. The converse is of course true of Retarded children.

The predominant cause of these relations may be hereditary or environmental or both, that is,—

7. Parents having telephones are inherently of good enough stock to have succeeded and hence naturally their offspring are also of superior native ability.

8. Parents having telephones presumably also have homes in which the physical and educational environment are favorable to the children's mental life and school success.

9. The most reasonable view would seem that both the preceding factors are involved in varying proportions together with numerous minor causes. Whatever be the ultimate explanation, however, the data point to a very real association between parental standing and intelligence of offspring, worthy of much more careful analysis and evidently of no inconsiderable social significance.

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## EDITORIAL

**A New Humanism Needed**

The classicists are growing desperate. They feel that they must put forth every effort "to defend the citadel of culture against the onrushing hoard of rude barbarians." Their monopoly of secondary education was broken a generation ago when the natural sciences fought and won their way to recognition in the course of study. But the sciences were parvenu, their teaching was poorly organized, and the tradition of culture was against them. Thus the classics held on. Greek, it is true, practically disappeared, but Latin took an upward turn, and experienced what might justly be termed a revival. Now comes the experimentalist, and with clear, unfaltering eye and steady, relentless tone, he demands of each subject the justification for its existence. Well may the Professor Shoreys, the Principal Stearns, the Dean Wests and other Latinists rush to the defense. They realize that behind President Eliot and Dr. Flexner is the grow-

ing host of scientific students of education in this country, that behind these are the rank and file of public school men, and that behind these are the American people, asking what does the study of Latin contribute to the well-being of the coming generation.

In the defense of their cause the Latinists fall back upon medieval nomenclature, and cry out that this is an "Assault on Humanism." They ignore the fact that the term "Humanism" was applied to the effort to get away from the pedantic formalism of scholastic hair-splitting, and to return to the rich, free, many-sided intellectual development of the Greeks. They ignore the fact that this movement speedily relapsed into a linguistic and grammatical formalism that was more barren than the one which preceeded it. They ignore the fact that this narrow linguistic "Ciceronianism" has persisted in classical studies from the time of Erasmus to the present day. The technical, linguistic training afforded by the Latin courses in our high schools and colleges has not even as much right to the term "Humanism" as that given by courses in stenography, cooking or carpentry. For the latter courses are less abstract, less formal, less remote from present day human interests.

The great need of our elementary and secondary education today is a reorganization on the basis of a "New Humanism." We need to make a systematic inquiry to determine what lines of contemporary human thought, human activities, human striving are most significant for and can be best utilized in educational procedure. Far from being inimical to a genuine Humanism, the experimental movement sets itself the task of freeing education from the shackles of a traditional, grammatical Latinism, and of really humanizing it. Have the literature and history of Greece and Rome anything to offer us that will satisfy present human needs? We believe that they have. Then let us drive directly at that which is humanly significant in those records, and not waste years of time and effort on linguistic difficulties, which only a small percentage of pupils surmount, and which effectively blind the rest to any humanizing influences that the student of classic civilizations might discover.

This is an age of momentous happenings. Great changes are taking place around us. Great questions are being fought out. Great social movements are under way. When education demands so much of us in such a short time, is it wise, is it sane, is it humanizing to spend from four to six years on the study of a language which we shall never use when school days are over? J. C. B.

# NOTES AND NEWS

A department of vital economics has been established at the University of Rochester by the bequest of Lewis P. Ross, who directed that the income of his residuary estate of more than $800,000 should be used "to the end that human life may be prolonged with increased health and happiness."

The Connecticut State Department of Health points out in a recent bulletin that it is both safer and cheaper to keep the schools open in time of an epidemic of contagious disease, and establish a rigid quarantine and careful examination of the pupils, than it is to close the schools and throw the pupils together on the street with little or no protection.

A Ministry of Public Health and Social Welfare has been constituted for Austria with Dr. Baernreither as the first minister. It is to supervise the care of war invalids, to combat war diseases, and to centralize pre-existing, unco-ordinated departments of public health and sociology. It is to have the care also of the dependents of fallen soldiers, infant welfare, housing and insurance.—*Science.*

In a course of public lectures on "Animal Life and Human Progress" recently given at King's College, London, we note the following titles: "Man's Account with the Lower Animals," by A. Dendy; "Some Educational and Moral Aspects of Zoology," by G. C. Bourne; "Man and the Web of Life," by J. Arthur Thompson; "The Origin of Man," by F. Wood Jones; and "The Future of the Science of Breeding," by R. T. Punnett.

At the meeting of the New England Association of Colleges and Secondary Schools held at Boston, March 9, the subject for discussion was "The Modern School." The speakers were Charles W. Eliot, Harvard University, Paul Shorey, University of Chicago, Alfred E. Stearns, Phillips Andover Academy, and Otis W. Caldwell, the Lincoln School.

The Bureau of Educational Measurements and Standards, of the Kansas State Normal School, announces a Standardized Silent

Reading Test. This has been constructed on the lines of the old Kansas silent reading tests, but the exercises have been selected from school readers and other books which children read. Thus the criticism made of the old tests, that they are largely mathematical puzzles, is forestalled, and a reading situation is furnished that is more nearly normal. Dr. Monroe has promised an account of the standardization of this test for an early numberof the JOURNAL.

At the February meeting of the New York Branch of the American Psychological Association the following papers were presented: The Influence of Practice on Correlation of Abilities, by Georgina Strickland; A Tentative Formulation of a Psychology of Play, by Clara F. Chassel; Families of American Men of Science, by Dean R. Brimhall; A Note on a Mathematical Prodigy, by Lorle I. Stecher; and Redintegrative Mechanisms in the Psychoneuroses, by H. L. Hollingworth.

The division of medicine of the National Research Council has perfected an organization of committees to carry on war research work and to keep in close touch with research progress and problems in Europe. The Psychology Committee, Major Robert M. Yerkes, Chairman, includes the following subcommittees: (a) Methods for the Psychological Examination of Recruits, Robert M. Yerkes, Chairman; (b) Tests of Special Skill, Edward L. Thorndike, Chairman; (c) Problems of Aviation, including the Examination of Aviation Recruits, Edward L. Thorndike, Chairman; (d) Incapacity, Re-education and Vocational Training, Shepherd I. Franz, Chairman; (e) Visual Problems, Raymond Dodge, Chairman.

Dr. Bird T. Baldwin, director of the child welfare research station, University of Iowa, has been commissioned major in the sanitary corps of the United States Army in connection with the psychological examination of recruits. His place in the University of Iowa will be filled temporarily by Professor E. E. Faris.

Professor M. E. Haggerty, of the University of Minnesota, has received a commission as major in the sanitary corps of the army. Major Haggerty will have charge of psychological work in connection with special hospitals and the re-education of wounded and disabled soldiers.

The following psychologists have received commissions in the sanitary corps for psychological testing in the army: Albert T. Poffenberger, instructor in psychology, Columbia University, captain; Garry C. Myers, department of psychology, Brooklyn Training School for Teachers, lieutenant; Schachne Isaacs, instructor in psychology, University of Cincinnati, lieutenant (psychological research in high altitude aviation); Roberts B. Owen, instructor in philosophy, Columbia University, lieutenant.

Dr. Henry Maudsley, the distinguished British alienist and psychologist, has died at the age of eighty-three years.—*Journal of Philosophy, Psychology and Scientific Methods.*

Dr. Henry H. Goddard, for ten years head of the research department of the Vineland Training School, has been appointed head of the Bureau of Juvenile Research of the State of Ohio.

Dr. Edwin Bissell Holt, assistant professor of psychology at Harvard University, has tendered his resignation to take effect September 1, 1918.

Mr. John F. Arundel, principal of the Lincoln School, Cincinnati, has been appointed to the newly created post of director of vocational education in Cincinnati.—*School and Society.*

Frederick W. Steacy (Ph.D., Teachers College, Columbia University) has been appointed lecturer in education at McDonald College, the teachers' training department of McGill University, Montreal, Canada.

# PUBLICATIONS RECEIVED

FRANCES R. ANGUS. *Fundamentals of French.* New York: Henry Holt and Company, 1916. Pp. xv, 280.

This admirable introductory French book offers a combination of the direct and the grammar methods. There are many stories illustrating difficult grammatical constructions, there are model letters giving drill on practical forms, and there is ample provision for conversational material.

WALTER S. ATHEARN. *Religious Education and American Democracy.* Boston: The Pilgrim Press, 1917. Pp. xi, 394. $1.50.

A program for religious education similar to and parallel with the secular public school education. The separation of church and state is enthusiastically defended, but the church needs to offer a more adequate and systematic religious education. The book shows sound scholarship and sympathetic vision.

ALBERT F. BLAISDEL AND FRANCIS K. BALL. *American History for Little Folks.* Boston: Little, Brown and Company, 1917. Pp. x, 138. $.75.

A series of charming stories about dramatic incidents in the history of our country. The book is intended for children of the third and fourth grades.

EMMA MILLER BOLENIUS. *Everyday English Composition.* New York: American Book Company, 1917. Pp. xii, 340.

Direct, vivid, practical, crowded full of valuable points. An interesting feature is the abundance of tiny illustrative drawings in the text. The chapter on reporting, special articles, and editorials will be especially useful in connection with the school paper.

BURTIS BURR BREESE. *Psychology.* New York: Charles Scribner's Sons, 1917. Pp. x, 482.

This is distinctly a sensationalistic rather than a behavioristic psychology. The neural substrate of mental activity is richly illustrated with excellent diagrams, and there are well-selected figures of the sense organs and of visual illusions. The motor aspect of consciousness is treated very briefly, the subject of habit being dismissed in a few sentences in the eighteenth chapter. The text is avowedly eclectic, and aims to present the generally accepted facts of modern psychology. This aim is attained with a high degree of success.

H. A. BROWN. *The Measurement of Ability to Read.* Concord, N. H.: Bureau of Research, State Department of Public Instruction, 1916. Pp. 57.

The fact that a second edition of this study of the measurement of reading has been called for is an indication of the rapidly growing interest in the subject. It is to be hoped that the author will give us the results of the further application of his test.

STEPHEN SHELDON COLVIN. *An Introduction to High School Teaching.* New York: The Macmillan Company, 1917. Pp. xxi, 451. $1.60.

This book is not a treatise on high school organization and administration, nor does it concern itself greatly with the specific subjects of the high school course of study. It is rather a discussion of general methods in secondary teaching. There is an introductory consideration of the nature of secondary education, the high school pupil, and the high school teacher, followed by three chapters on discipline, indirect and direct control, and the function of punishment. The remaining chapters develop such aspects of method as elimination of waste, testing knowledge, conduct of drill, oral and book instruction, illustration and demonstration, stimulating pupils to think, inductive and deductive development lessons, the use of the question, lesson plans, and supervised study. When principals and superintendents begin to demand of their high school teachers the study of such books as this, the teaching in our high schools will show a vast improvement.

KARY C. DAVIS. *Productive Plant Husbandry.* Philadelphia: J. B. Lippincott Company, 1917. Pp. xvi, 462.

With such stimulating and scholarly text-books the courses in high school agriculture should rise to a high plane of popularity and value. The present book deals with plant selection and breeding, soils, field crops, gardening, fruit growing, forestry, control of insects and plant diseases, and the outlines of farm management. There are over three hundred splendid illustrations.

GEORGE R. DAVIES. *Social Environment.* Chicago: A. C. McClurg and Company, 1917. Pp. 149. Fifty cents.

The author accepts the biological and evolutionary point of view as the basis of sociological theory, but contends that the higher spiritual values, which with advancing civilization become more and more clearly conscious social ideals, have failed to receive due weight in the explanation of social progress. Scientific social organization will take account of ethical idealism as the most significant dynamic factor, and will strive for such legislation as will give most effective embodiment to this idealism.

FR. DE HOVRE. *German and English Education.* New York: Charles Scribner's Sons, 1917. Pp. 108.

This is a stimulating comparative study of the two civilizations now at death grips with each other, and of the type of education upon which each is based. The author, who was professor of the philosophy of education at the University of Louvain, has had exceptional opportunities for studying both systems at close range. He is clearly cognizant of all the magnificant achievements of German education in moulding the thoughts and will of the people, yet he claims that in point of organic principles England has nothing to learn from Germany. Reforms are demanded, and the effect of these reforms may be far-reaching, but they must be worked out on the basis of fundamental English characteristics and ideals.

E. A. DOLL. *Clinical Studies in Feeble-Mindedness.* Boston: Richard G. Badger, 1917. Pp. 232. $2.50.

This is an account of a series of studies selected from the great mass of material accumulated at Vineland to illustrate and clarify some of the fundamental questions about feeble-mindedness. The author has aimed to indicate the several points of view from which feeble-mindedness may be defined and to formulate such definitions, to illustrate differential diagnosis of mental defect, and to evaluate typical examinational data. According to the psychological criterion feeble-mindedness is arrested development of general intelligence at a point not exceeding the capacity of a twelve-year-old normal child. The social criterion calls for social inefficiency due to arrested development. The pedagogical criterion rests upon scholastic deficiency. The medical criterion assumes a diseased or defective condition characterized by a greater or less number of physical abnormalities, particularly of the nervous system. The somatic criterion recognizes a more or less complete retardation of the entire organism, physical, physiological and anatomical, as well as mental. The hereditary criterion asserts that true feeble-mindedness results from deficiencies in the germ plasm, and that these deficiencies will show themselves in the descendants in definite relations. The application of these criteria is illustrated by the detailed study of six typical cases. The book will be carefully studied by those interested in the diagnosis and treatment of feeble-mindedness.

JAMES DREVER. *Instinct in Man. A Contribution to the Psychology of Education.* New York: G. P. Putnam's Sons, 1917. Pp. x, 281. $2.25.

This is an elaborate and systematic study of a subject that has played a very important role in works on educational psychology in the past two decades. As such it deserves thoughtful and critical consideration. The author first presents a historical survey of philosophical and scientific views of instinct from Hobbes to the present day, then enters upon a psychological analysis of the nature of instinct in its relation to intelligence and meaning, and finally traces the relation of instinct to other aspects of experience, notably the emotions, and to the phenomena of de-

velopment and education. He seems disposed to reject Thorndike's invitation "to discard such vague phrases as the instincts of pugnacity, gregariousness, cruelty, curiosity, constructiveness, play and the like, and to substitute for them descriptions of the definite responses which are made to definite situations." His reasons for this rejection are that in the first place the definiteness of the responses is illusory, and in the second place that "with a view to the development of a psychology of education the 'class names' are exceedingly valuable, since their very 'vagueness' indicates that indeterminateness which is for the educator so significant a feature of the instinctive equipment of the human being." After this it is not surprising that McDougall's views of the nature of instinct are accepted, and that the discussion is devoted largely to the verbal and schematic analyses of James, Morgan, Shand, Groos and others.

S. FERENCZI. *Contributions to Psycho-Analysis.* Authorized translation by Dr. Ernest Jones. Boston: Richard G. Badger, 1916. Pp. 288. $3.00.

The author is medical advisor to the Hungarian law courts, and has made extensive studies in the field of psycho-analysis. In this book the translator presents fifteen of his more important papers. They offer brilliant examples of the interpretation of psychopathic disorders in terms of sexual sublimations, such as we have learned to expect from the psycho-analytic school.

HENRY T. FINCK. *Richard Strauss, The Man and His Works.* Boston: Little, Brown and Company, 1917. Pp. xxvii, 328. $2.50.

Music lovers will be keenly interested in this biographical and critical study of the greatest living master of orchestral tone coloring made by the veteran musical critic and biographer of Richard Wagner. In view of the author's admiration for Wagner it is perhaps not surprising that he should take a somewhat derogatory attitude toward Strauss's opera technique. The book is indeed no outpouring of fulsome adulation. So coolly critical is it that many of Strauss's admirers will resent it as another instance of the failure of the old to understand and appreciate the new. Yet in spite of its many sharp critical thrusts, and its perhaps ungenerous comparisons with "the great Richard," the book sets forth Strauss the musician in clear, vigorous, forceful outlines, and makes us realize that here we meet a musical genius of the first order. No thoughtful student of music as a factor in life can afford to overlook this book.

THOMAS WALTON GALLOWAY. *The Use of Motives in Teaching Morals and Religion.* Boston: The Pilgrim Press, 1917. Pp. xi, 187. $1.25.

This little manual is an attempt by a successful teacher and textbook writer of zoology to apply to religious teaching the principles that have been derived in the teaching of school subjects. In the introductory chapters he outlines and illustrates these principles, and in chapters four to nine he applies them to the motivation of religious and moral teaching. The concluding chapters deal with the forms of expression in which such teaching should eventuate. The book is well conceived and skillfully executed, and should be of great assistance in training the immature teachers of the Sunday School.

FR. AGOSTINO GEMELLI. *Il nostro Soldato. Saggi di Psicologia Militare.* Milano: Societa Editoriale Vita e Pensiero, 1917. Pp. xii, 339.

In Europe the immediacy and long continuation of the war have produced a more profound and wide-spread effect upon all phases of thought than has yet been the case in this country. European medical, educational and psychological discussions are all dominated by it. The present book is an interesting and serious study of the psychology of the soldier. Among the topics considered are the psychic factors entering into victory, the mental attitude of trench life, the intellectual and moral aspects of battle, a psychological analysis of courage on the battle-field, fear, superstition, military folk-lore, the songs of the soldiers, the acoustic illusions of battle, the psychology of the officer, psychology and strategy, and the pathological effects of fear in war. The author is a captain in the medical service, and has had an excellent opportunity for first hand studies of the conditions which he discusses. The

book abounds in shrewd observations and reflective explanations. It is not merely a record of personal experiences, but a well-digested scientific work in which the author takes due account of recent French and English contributions to the topic of which he treats.

FRED. M. GERLACH. *Vocabulary Studies.* Colorado College Studies in Education and Psychology, Number one, 1917. Pp. 123. Thirty-five cents.

In view of the fact that language is at once the highest manifestation of human activity and the most important means of conserving and advancing human culture through education, it is surprising that so little attention has been devoted to the scientific study of its acquisition. The author's general discussion summarizes the scattered studies that have been made, and presents in comparative tables the results obtained by Kirkpatrick, Babbitt, Doran, and others. It is remarkable that no mention is made of Terman's excellent studies in this field. The third part gives a detailed account of the "false definition test" as employed at Colorado College. One thousand words were selected "by position" from Funk and Wagnalls' New Standard Dictionary representing a total of 250,000 vocabulary terms. Four hundred of the selected words were so unfamiliar that the subjects were merely asked to check those with which they were acquainted. Each of the remaining six hundred words was supplied with four definitions, only one of which was correct, and the subjects were asked to check the correct definitions. Both of these lists are given in appendices, together with a representative list of 100 words arranged in order of difficulty. The lists were given to students ranging from high school freshmen to college seniors, and the average computed vocabulary varied from 66,650 for the high school freshmen to 94,075 for the college seniors. These results are over four times as large as those secured by Kirkpatrick. There is a bibliography of 63 numbers.

CLARENCE TRUMAN GRAY. *Types of Reading Ability as Exhibited through Tests and Laboratory Experiments.* Supplementary Educational Monographs, No. 5. Chicago: University of Chicago Press, 1917. Pp. xviii, 196. $1.25.

This is a detailed study of the motor phases of reading, of the span of visual perception, and of the measurement of abilities in oral and silent reading on the same subjects. With the most refined and delicate apparatus the eye-movements in reading were photographed, the subject's breathing was recorded, the vocal utterances were fixed on a phonograph synchronized with the eye-movement apparatus, and the range of perception was determined by short exposure, recognition and Aussage tests. Good and poor readers were studied from each of the elementary grades, and from high school and college classes, and their characteristic differences noted. In the final section there is a study of the effect of practice upon certain difficulties in reading. The practice included speed training, increase in span of attention, training in comprehension, reduction of vocalization, and training in phonics.

ALBERT BUSHNELL HART. *New American History.* New York: American Book Company, 1917. Pp. vii, 650, lii.

This is a splendid example of the new type of history that is now being offered to the boys and girls in the high school. The product of the ripest and most authoritative scholarship, the book is written in a simple narrative style, richly illustrated with attractive pictures, drawings and maps, and amply furnished with references and helps for study. Of the entire 650 pages 450 are devoted to the development of the country since the close of the Revolution. Particular stress is laid upon the social forces that were active in that development. The general use of such a text will go far to develop that broad spirit of Americanism of which we now stand so much in need.

CHEESMAN A. HERRICK. *History of Commerce and Industry.* New York: The Macmillan Company, 1917. Pp. xxv, 562. $1.60.

The author's aim in this book has been to present the essentials of history from the commercial and industrial point of view, to trace the history of a great movement

rather than the history of nations. Beginning with the Nile and the Euphrates the currents of trade are followed in the development of Phoenecia, Greece, Rome, the Italian republics, the Saracens and the Crusaders, the markets and fairs of the middle ages, the Hanseatic towns, the spirit of exploration in the fifteenth and sixteenth centuries, colonial Spain, commercial England, Dutch commerce, English North America, the industrial revolution, modern Britain, German commercial and industrial expansion, Russia, China, Japan, Latin America, the United States as a world power, and the outlook for a greater America. This is a type of history that is vastly more significant than military campaigns or the lives of individual rulers. The story is well told, and illustrated with many striking photographs. There are excellent bibliographies and suggestions for study.

JAMES L. HUGHES. *Training the Children.* New York: The A. S. Barnes Company, 1917. Pp. 148.

The purpose of the author is to contrast the old training of coercion with the new training of freedom and self-activity. The book is the outgrowth of a long life of teaching and supervision, and yet shows nothing of the cut-and-dried attitude of the administrator, but is full of sympathy with and understanding of the child. "Freedom for the child should mean freedom from abuse, freedom from coercion, freedom to work out his own plans in his own life department."

A. EAGLEFIELD HULL. *Scriabin, A Great Russian Tone-Poet.* New York: E. P. Dutton and Company, 1916. Pp. viii, 304. $1.25.

Scriabin is a composer of whom all too little is known in America. Of an original, aggressive disposition, he found it difficult to work in harmony with others, and thus failed to receive in his time the recognition that was his due. Born in 1871, he was trained as an officer in the Russian army, but early manifested a passion for music and received instruction under some of the most celebrated Russian composers. He became a great piano virtuoso, and was an extremely prolific composer for that instrument and for the orchestra. He might well be called the Russian Chopin. His music is characterized by wonderful richness of harmony and a profound mysticism which developed into an attempt at the harmonization of all the arts. The author of the present book distinctly disclaims the intention of writing a biography, but he succeeds admirably in giving us a clear-cut impression of the genius of the artist and of the rich store of music which he produced before his untimely death.

LOUIS HUOT ET PAUL VOIVENEL. *Le Courage.* Paris: Librairie Felix Alcan, 1917. Pp. vii, 358. Francs 3.50.

This is another of the excellent books on the psychology of the war which are now appearing in Europe. According to the authors "war has been and will be," and it is the duty of the scientific student to examine its fundamental nature and analyze the phenomena which it reveals. Both the authors are medical officers in the army and have seen much active service. They claim that courage does not exist among animals, that real courage requires a development of intelligence that is found only in man. They trace the natural history of courage, describe the fear that is keenly recognized but held in check by steadfastness of purpose, the force of altruistic ideas, the effects of habit and experience, the love of risk, and depict the characteristics of group courage, of national spirit, of the intoxication of battle, and of the pathology of courage.

ALEXANDER INGLIS. *Principles of Secondary Education.* Boston: Houghton Mifflin Company, 1918. Pp. xvi, 741.

This book is a veritable encyclopedia of secondary education, but differs from the treatises of Johnston and Monroe in the unity of aim and of construction secured by a single author. Part I deals with the pupils, and surveys the physical and mental traits of high school pupils, their individual differences, and the general character and classification of the high school population. Part II discusses the high school as an institution, sketches the history of secondary education in America and other countries, shows its relation to elementary and higher education, and develops its social principles and fundamental aims. Part III describes the means and materials

of secondary education, the program of studies, and the place of the special subjects, as English, foreign languages, mathematics, natural sciences, social sciences, practical and fine arts, etc., in that program. The treatment of each of these topics is remarkably well-rounded and complete.

HERMAN G. JAMES. *Municipal Functions.* New York: D. Appleton and Company, 1917. Pp. xi, 369. $2.00.

The purpose of this book is to inform the average citizen in regard to what is being done by progressive municipalities, and to point the way toward a fuller utilization of municipal activities for the welfare of all. Among the topics considered are public safety, health, education, morals, social welfare, city planning, public works, municipal ownership, and municipal finances. If educators are to fill the places of community leaders, they need to give careful consideration to municipal problems, and this book will be of great assistance to them.

BUFORD JENNETTE JOHNSON. *Experimental Study of Motor Abilities of Children in the Primary Grades.* Johns Hopkins University Studies in Education, No. 2. Baltimore: The Johns Hopkins Press, 1917. Pp. 62. Seventy-five cents.

This study of the motor activities of children was suggested by the success with which motion studies have been utilized in increasing the efficiency of industrial workers. The author gives a brief summary of previous studies on the speed and accuracy of movement, and recounts experiments with nineteen first grade children in rate of tapping, steadiness of control, reaction times, accuracy in throwing, and preference for side of the body used. There is marked improvement with practice, but the improvement is so irregular that it is not safe to take the first trial or the average of the first few trials as the index of ability.

EDWARD SAFFORD JONES. *Influence of Age and Experience on Correlations Concerned with Mental Testing.* Baltimore: Warwick and York, 1917. Educational Psychology Monographs, No. 22. Pp. 89. $1.25.

This study is the outcome of work done in connection with the Cincinnati Vocational Bureau. Two hundred and three unselected boys were examined when they secured working papers at the age of fourteen and each year thereafter for four successive years. From a large number of mental and physical tests the following were chosen for this study: Cancellation, substitution, rote memory, completion and opposites tests. The author finds a marked fidelity to intellectual type throughout the adolescent period, and believes that one well-rounded testing of an individual is likely to place his general intellectual rank for several years to come.

TRUMAN LEE KELLEY. *Mental Aspects of Delinquency.* University of Texas Bulletin, March 1, 1917. Pp. 125.

Two hundred and ninety-three delinquent boys in the Texas State Juvenile Training School were examined for their height, weight, vital capacity, head measurements, pubertal development, vision, hearing, nose and throat, strength of grip, handedness, tapping, school grade, Binet age, constructive ability, and ability in a modified Trabue completion test. The boys were found to be normal or above in height, weight, vital capacity, and head circumference, but below normal in all the other measurements. They were conspicuously low in the mental tests. There are detailed tables of the individual results, a discussion of the findings on the basis of other studies of delinquency, and a valuable annotated bibliography.

MABEL HYDE KITTREDGE. *The Home and its Management.* New York: The Century Company, 1917. Pp. 385. $1.50.

This "Handbook in Home-making" with its three hundred inexpensive receipts is very timely in view of the obligation resting upon us to economize both food and money to win the war. The book is designed not for the university graduate, but for the plain girl in the kitchen. The suggestions for the selection and preparation of foods will be valuable even to those who have had wide experience in housekeeping.

M. G. KIRKPATRICK. *The Rural School from Within.* Philadelphia: J. B. Lippincott Company, 1917. Pp. 303.

Personal experiences are always interesting, and this account of personal experiences in country school teaching is no exception to the rule. In some respects no type of teaching is more difficult, makes greater demands upon the patience, steadfastness and ingenuity of the teacher. The young and inexperienced teacher will find many helpful hints in these pages.

DANIEL WOLFORD LA RUE. *The Science and the Art of Teaching.* New York: The American Book Company, 1917. Pp. 336.

Young teachers need to be encouraged to survey their work as a whole in order to see the individual tasks in their proper perspective. Methods of teaching are determined by four factors: The nature of the child (involving a study of general and individual psychology), the manipulations of the teacher, the nature of the subject matter taught, and the educational ideals of the time and the community. In the discussion of the second factor the author includes a brief chapter on pedagogical measurements.

DARWIN OLIVER LYON. *Memory and the Learning Process.* Baltimore: Warwick and York, 1917. Pp. 184. $2.00.

This elaborate investigation of memory in connection with education gives an account of experiments which the author has been conducting since 1906. At the outbreak of the war, in 1914, the manuscript was lost in Germany, and the book had to be rewritten from the author's original notes. The discussion includes an analysis of the mental activities included under "memory," the subdivisions of the topic, with especial reference to the learning process, the relation of length of material to time of learning, the relation of quickness of learning to retentiveness, and the educational value of psychological research, with a critical consideration of the value of mnemonic systems. Appendices present the details of the tests, and a pocket at the back contains a number of finely drawn plates in colors. It is a valuable contribution to the study of memory, and will command wide attention.

CYRUS D. MEAD. *An Experiment in the Fundamentals.* School Efficiency Monographs. Yonkers-on-Hudson: World Book Company, 1917. Pp. xiv, 54. Sixty cents.

A comparative study of the Courtis Standard Practice Tests and the Thompson Minimum Essentials on nine hundred fifth grade pupils, divided into approximately equal groups. The results of the study were in favor of the Courtis Practice Tests, the classes using these showing almost twice as much gross gain as those using the Thompson material. The reason for this superiority seemed to lie in the greater zeal aroused in the pupils, and the greater ease in advancing and controlling the pupils' progress.

EDWIN L. MILLER. *English Literature: An Introduction and Guide to the Best English Books.* Philadelphia: J. B. Lippincott Company, 1917. Pp. 597.

Most high school courses in English literature demand the worst type of memory grind. Page after page of critical comment on the works of authors the pupils have never read and have no interest in must be prepared and recited. The present text is constructed on a different plan. It is intended as a guide to reading, and the effort of the author is to stimulate a desire to become familiar with these literary masterpieces that make an appeal to every properly constituted youth. Thus he takes the pupil's point of view, and presents his case so appealingly that one is consumed with eagerness to read these good things. Let us hope that teachers will use the book as the author intends, and will not force it into a recitation manual.

WALTER SCOTT MONROE, and Others. *Educational Tests and Measurements.* Boston: Houghton Mifflin Company, 1917. Pp. xxii, 309. $1.50.

A real science of education would enable us to determine just where each pupil stands at the beginning of the term in each school subject, and what progress may be expected of him during the term as a result of a given procedure. We are far

from this g al as yet, but the progress made toward it in the past five years is well set forth in the present volume. We find here an excellent survey of the Courtis, Stone, Woody, Cleveland, and other tests in arithmetic, the Thorndike, Haggerty, Starch Courtis, Brown, Gray, and Kansas reading tests, the Ayres, Buckingham and Starch spelling scales, the Thorndike, Ayres, Johnston, Breed, Freeman, and ot er handwriting scales, the Hillegas, Harvard-Newton, Breed, Willing, Trabue, S arch, and other language scales, and the fragmentary work that has been done in the study of the various high school subjects. There is a chapter on statistical methods, and one on the use of standard tests in the supervision of instruction.

DEWITT H. PARKER. *The Self and Nature.* Cambridge, Mass.: Harvard University Press, 1917. Pp. ix, 316. $2.00.

However emphatically we may be told that this is a materialistic and grossly practical age, we still find a goodly number of those enterprising souls to whom the romance of metaphysics makes a powerful appeal. It is in the spirit of a quest, of an intellectual adventure, of a logical voyage of discovery that the author bids us set out with him in an examination of the basic facts of experience. On our quest we meet and tilt with many familiar characters, James, Royce, Bergson, Bradley, Russell and others, and these passages at arms are attractive features of the adventure. Do we arrive anywhere, do we discover anything? This is an individual question, and the answer must be left to the individual reader. At least it is a very entertaining and stimulating journey.

ANGELO PATRI. *A Schoolmaster of the Great City.* New York: The Macmillan Company, 1917. Pp. 221. $1.25.

This is one of the most fascinating and inspiring books on general educational topics that the past year has furnished. The son of a poor Italian immigrant, starting to school only when eleven years old, the author has pushed forward until he has become one of the most successful and influential school principals in New York City. It is not a consecutive autobiography that he gives, but rather a series of dramatic pictures, portraying the strivings and aspirations of a sincere and earnest teacher in his efforts to touch and quicken the lives of the children in a great city. It depicts for modern New York conditions something of the same spirit and courage and kindliness that is shown for the middle west three-quarters of a century ago in the life-story of Abraham Lincoln.

RUDOLF PINTNER AND MARGARET M. ANDERSON. *The Picture Completion Test.* Educational Psychology Monographs, No. 20. Baltimore: Warwick and York, 1917. Pp. 101. $1.25.

This is a study of the application of a single test, the Healy Picture Completion Test, to over 1500 children from five to sixteen years of age. The test is described, previous uses of it discussed, the results are tabulated, the method of scoring worked out, norms for each age are derived, and there is a consideration of the relation between the results and sex, social status and school standing. The accelerated pupils did better than the retarded pupils, showing that the test differentiates between good and poor pupils. Such detailed studies as this contribute materially to the advancement of the science of mental testing.

W. F. ROBIE. *Rational Sex Ethics.* Boston: Richard G. Badger, 1917. Pp. 356. $3.50.

In every civilized country men are now seriously concerned with the birth-rate. But the birth-rate depends upon economic, social and psychological factors which underlie the founding of a family. The present book is the sanest and frankest consideration of one of those factors, sexual attractiveness, that we have ever seen. On the basis of a large number of case studies the author, who is a practicing physician, gives valuable advice for the maintainance of a normal, healthy sex life. While the book is for sale only to members of the medical and legal professions, no physician could do better service than present a copy to every young married couple of his acquaintance.

WILLIAM M. SALTER. *Nietzsche, the Thinker.* New York: Henry Holt and Company, 1917. Pp. x, 539. $3.50.

At the present time Nietzsche is more or less justly held responsible for the frightfulness and ruthlessness with which Germany is waging war. Yet while the Germans may find philosophical justification for much of their conduct in Nietzsche's writings, it must be remembered that Prussianism and the whole military system for which Prussia stands were utterly abhorred by the philosopher. The present admirable and thoroughly scholarly work gives a clear and coherent account of Nietzsche's philosophy and an especially valuable critique of his theory of morality. The fragmentary, aphoristic style and lack of systematic development in Nietzsche's writings make such an organizing commentary necessary for an understanding of his fundamental doctrines. The author has acquitted himself masterfully, and his book will stand as the authorative interpretation of Nietzsche in English.

OSIAS L. SCHWARZ. *General Types of Superior Men.* Boston: Richard G. Badger, 1917. Pp. 435. $2.50.

In a preface Jack London says of this book: "General Types of Superior Men is one of those immortal, epoch-making works which appear only at very long intervals . . . . . The psychology of the various and many types of superior men is merely the nucleus of his subject from which Mr. Schwarz ventures into all regions of human knowledge in order to build up his original philosophy of human life." A less sympathetic commentator might characterize the book as a Bolshevik attack on what is ordinarily called the "superior man." Of psychology in any scientific sense the book shows not a trace .

*Science and Learning in France, with a Survey of Opportunity for American Students in French Universities.* An Appreciation by American Scholars. Published by the Society for American Fellowships in France, 1917. Pp. xxxviii, 454.

This sumptuous volume was prepared to show what France has done for the advancement of science, and what American students might gain by study in France. Each chapter sets forth briefly what noteworthy contributions Frenchmen have made to a given field of human knowledge, who are the leading French contributors to that field at the present time, and what opportunities are offered for graduate work in that subject in France. The book gives a good account of past and contemporary French science.

W. T. SEDGWICK AND H. W. TYLER. *A Short History of Science.* New York: The Macmillan Company, 1917. Pp. xv, 474. $2.50.

This book is the outgrowth of a lecture course which the authors have given for several years to students of the Massachusetts Institute of Technology. It is distinctly more elaborate and contains more abundant quotations from source material than other recent texts on the history of science. Of the scientific accuracy of a book by such authors there could be no question. One misses, however, the imaginative touch which fills in the gaps, rounds out the probable trend of development, and gives the student the interpretive benefit of the author's study. Such a procedure is not scientifically accurate, but it inspires the student and helps him recreate the past. The book is richly illustrated with portraits of eminent scientists and photographs of maps, diagrams, and instruments.

ELIZABETH SEVERN. *The Psychology of Behavior.* New York: Dodd, Mead, and Company, 1917. Pp. ix, 349. $1.50.

The sub-title of this book is "A Practical Study of Human Personality and Conduct with Special Reference to Methods of Development." The topics treated are the subconscious, intellect (perception), imagination and memory, will, emotion, sex and the ego. In spite of the somewhat formal analytical tendency in the discussion of these topics, the author's positions are well taken, and there are many shrewd practical observations that are commendable.

FRANK CHAPMAN SHARP. *Education for Character. Moral Training in the School and Home.* Indianapolis: The Bobbs-Merrill Company, 1917. Pp. 453. $1.25.

The central problem of this book is how directly to develop and strengthen loyalty

to moral ideals as such. The author confines himself to a survey of the concrete aims of moral education and the agencies and instruments by which they may be attained. There is a good discussion of the importance and limitations of the personality of the teacher, and the factor of personality in leadership among the pupils. The advantages and disadvantages of pupil government are pointed out, the need for direct moral instruction is emphasized, and a somewhat elaborate plan for moral instruction on the basis of biography and social service is worked out. Appendices contain a detailed program of moral instruction for the elementary school, a series of practical questions and exercises, and an extensive bibliography.

FRANK WEBSTER SMITH. *The High School. A Study of Origins and Tendencies.* New York: Sturgis and Walton Company, 1917. Pp. xviii, 458. $2.00.

The high school by its wonderfully rapid development and its articulation with both the elementary school and the college is one of the most interesting and significant aspects of American education. Impressed with this fact the author set himself to inquire into the history of the institution, and the result is a valuable historical study of secondary education from primitive times to the present. There is an excellent account of Quintilian's secondary school, secondary education in medieval times, a briefer sketch of secondary education from the fifteenth to the nineteenth centuries, and a trenchant discussion of high school practices and tendencies at the present time. The book is a valuable addition to the literature of secondary education.

LYNN THORNDIKE. *The History of Medieval Europe.* Boston: Houghton Mifflin Company, 1917. Pp. xxi, 682.

It has become the custom in many colleges to make the first course in history a history of medieval Europe. A study of this period seems to lay the best foundation for subsequent courses both in modern and in ancient history. It is to provide a text for such a course that the present book is intended, and casual inspection leads one to think that it will serve its purpose excellently. The discussion is much fuller and more detailed than the ordinary text, and much attention is paid to social and economic conditions, as the City of God, the spread of monasticism, the feudal land system, the medieval church, the rise of towns and guilds, medieval literature, and the Italian renaissance.

J. E. WALLACE WALLIN. *Problems of Subnormality.* Yonkers-on-Hudson: World Book Company, 1917. Pp. xv, 485. $3.00.

Undoubtedly the subnormal child has had more than his just share of attention in the educational discussions of the past four or five years. But with all the consideration given to him we are still far from giving him the kind of treatment that he needs, and we are even farther from relieving the normal child from the drag of his company. In the first hundred pages of this book the author sketches the history of the movement, and reports a study of 170 pupils in special classes in St. Louis. In chapter two he considers the problem of diagnosis, reviews the reports of feeble-mindedness resulting from the surveys of several institutions, and cautions against a pronouncement of feeble-mindedness on the basis of any single test, such as that of Binet. Chapter three lays down thirteen principles for the organization of work with mentally retarded children, and the remaining four chapters treat of feeblemindedness in its educational and social aspects, epilepsy, state provisions for defective children, and the hygiene of eugenic generation.

MRS. HUMPHREY WARD. *Missing.* New York: Dodd, Mead and Company, 1917. Pp. 398. $1.50.

This is an English romance of the early days of the war. The hero, an officer who has been slightly wounded, and is now on leave, meets, falls in love with, and marries the heroine in a few weeks. After a short honeymoon he is recalled to the colors, and the young wife is left to the machinations of a rather calculating sister who does her best to establish friendly relations with a neighboring squire. Later the husband is reported "missing" and in the absence of further news the squire presses his suit, and almost succeeds in comforting the 'widow,' when news comes that the

husband has been found severely wounded. In deep remorse the wife hurries to her husband, and although he subsequently dies, she will have nothing more to do with her sister or the squire. There are many skillful characterizations of the cross currents of English thought at the outbreak of the war.

HUTTON WEBSTER. *Early European History.* New York: D. C. Heath and Company, 1917. Pp. xxxv, 715. $1.60.

In less than 300 pages the author reveals to high school pupils the vital experiences of the ancient peoples. The greater part of the space is devoted to the period from the fifth to the seventeenth century. In treating this period prominence is given to the rich social lessons, the slow emerging of the common people, the progress of the ideals that sway men and nations. The volume was planned in accordance with the recommendations made in 1916 by the Committee on Social Studies of the Commission on the Reorganization of Secondary Education of the National Education Association. It is written in a clear, attractive style, is well equipped with maps and illustrations, and is well suited to the interests and capacities of high school pupils.

H. B. WILSON. *Training Pupils to Study.* Baltimore: Warwick and York, 1917. Pp. viii, 72. Fifty cents.

This little book is the outgrowth of the efforts of the teachers of a school system to teach their pupils how to study. The author analyzes study into eleven essential factors, abundantly illustrating each point with instances from schoolroom practice. This is followed by reports on training pupils to study in the various school subjects from the second to the eighth grade. While these reports only indicate a few of the things that might be done, they at least show what some enterprising teachers are doing to stimulate study.